MORE COLOR FOR YOU

COLOR COLOR COLOR

JANE BETSEY WELLING

Marion P. Lane

"I am writing to tell you how much I have enjoyed and profited by reading Jane Betsy Welling's new book on MORE COLOR FOR YOU. It contains those essential facts of color knowledge on which effective art teaching in all schools largely depends. A careful analysis of art form reveals three structural elements that can be distinguished but not separated in all beautiful things: i.e., line, mass and color. The greatest of these elements is *color,* for without it things would not be visible at all. MORE COLOR FOR YOU "makes visible" to all those who can see color a practical means to teaching color knowledge and to the ultimate development of color appreciation; for this can be realized, as Miss Welling so conclusively demonstrates, through considering light as the color source, the relationships existing between colors themselves, color mixing, color visibility, combinations of colors, quantities of color, material for producing color and color dramatizations. On the whole this book on color is one of the most helpful, from the teacher's standpoint, that has yet appeared. It should be included in the library of every teacher and supervisor of art, and might well be used as a textbook on color in normal art schools and in teacher training schools generally."

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More Color *for* You

Color Study Developed by the Experimental Method

By

JANE BETSEY WELLING
Supervisor of Art Education
Toledo, Ohio

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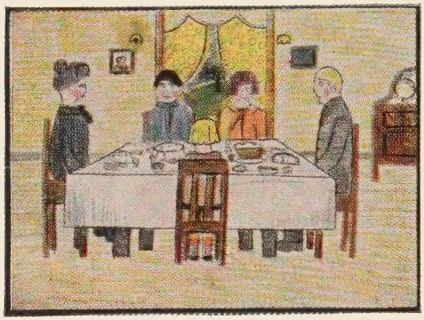
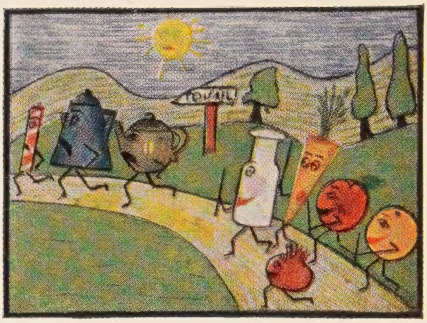
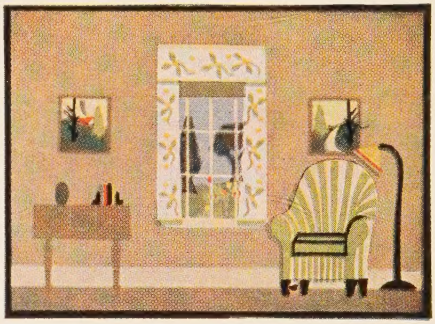


THE HOME—"Our Family at Table"—Grade V.



HEALTH—Miss Stenson's Class—Grade IV.

Crayon Poster in connection with Clothing Study
MY SUMMER WARDROBE Grade V



Cut Paper Poster in connection with House Planning—An Elevation of the Side Wall of a Living Room—Grade V

Painted Poster—One of a Series on Health Grade IV, Lagrange School

Painted Poster used to remind people of Garden Week—Grade IV

Acknowledgment

I wish to express my gratitude to Mr. Charles A. Meek, Superintendent of Schools, Toledo, Ohio, for his sympathetic encouragement of my efforts to develop a sort of color study which would make color a useful part of our elementary school work and to the DeVilbiss Manufacturing Company of Toledo for the opportunity to work out color problems in their Sales and Experimental Departments.

I wish to express my appreciation to the teachers and children of the elementary grades of the Toledo Public Schools, for their splendid cooperation in our color experimentation, and especially to Miss Isobel Stenson and to Miss Jane Hill, to whom I am indebted for much of the fine color material and illustrations in the following text.

I wish also to acknowledge the valuable assistance of my immediate associates, Miss Lettie M. Thorp and Miss Bess Gilmartin.

J. B. W.

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Foreword

NOWADAYS WE ARE ALL THINKING AND TALKING ABOUT COLOR IN ITS RELATION TO

CHILDREN

Color is for children a wonderful playground. Theirs is a spontaneous love of it. They revel in its brilliancy and variety. They are much more responsive to it than grown-ups, for the process of growing up, too often, stifles our enthusiasms.

CHOICE

Fine color depends largely on fine choice of amount. Too often, we overlook this most important fact in our stress on color mixing and color schemes which are unrelated to use.

FACTS

Color facts need to be understood. Color reactions need to be controlled by knowledge of color facts. Herein lies our initial danger. Facts are cold and hard. It is far too easy to dictate them and thus make them colder and harder. It is much more difficult to make them live and function, yet it has often been done. Our initial effort will have to go toward putting action into the teaching of color facts. Use the problem solving method. Make color study thought provoking. Proceed experimentally to find each fact. Find it out for yourself. Each experimentor is to have his power of color choice grow gradually stronger, for useful color information cannot be implanted full-grown.

THEORIES

Color theories represent some one's specific plans for disseminating color information. To be of educational worth, they must be made to stimulate independent thought and action. They furnish color data, but they can never take away the need for makings one's own choices and for developing one's own color taste.

PROBLEMS

The following experiments, explanations, and reviews were worked out by teachers and children who needed to know just what you need to know in order to use color with feeling and intelligence. They have applied the problem solving method and other modern educational practices to their study of color. Follow their directions and you, too, will make of color a potent ally.

USE

In this day of rapid change, color is becoming more and more important to all of us. It is everywhere around us. It is in our clothing, our home furnishings, our books and magazines, our buildings, and everything which we buy. We use it in selling. It is of great importance in advertising. We think of it when we set our tables and plan our food. We are perfecting colored moving pictures. Some of us have been interested in the "Clavilux," that marvelous instrument which plays colors instead of sounds. Every year brings a new emphasis on color. Surely we want to know enough about it to keep abreast of the times.

Preface

MORE COLOR FOR YOU

A Book of Color Study for Children and Teachers

WHAT IT IS.—Color study developed by the experimental method.

It shows how to present color as a series of problems to be solved. It ties color study up with other modern educational practices.

WHO CAN USE IT.—The children themselves.

The Classroom Teacher whose group wishes to know more about color. The Art Supervisor who is especially interested in methods of presenting color information. The Art Teacher who wishes to make her color teaching carry over into the other work of the school. The Rural Teacher who wants something useful for extra projects and activities that will add zest to the rest of the work. The Home Economics and Manual Training Teachers who wish to use more color in their work. The Special Class Teacher who can use color in all craft work. The Business Man or Business Woman who wishes to acquire more color data to apply in his or her work. For all of these, this little book offers means of gaining color information in a graphic way.

THE RELATION OF THE TEACHER TO IT.—An adviser and helper

There is no learned dispenser of facts. In the lower grades when the children have not yet learned to read, the teacher is also the interpreter who translates the directions into acts for her group.

THE RELATION OF THE CHILDREN TO IT.—The active experimenters.

The children are searchers after information. Finding out facts of color is their project, their problem, and it is up to them to get all that they can from each experiment.

HOW IT IS GRADED.—There is little grading.

The material has not been graded because an alert Primary Grade has been found to need and be able to understand the same data as an adult who has never studied color. The child's color problems are just as real to him and involve as much fundamental color theory as those of an adult. Therefore, we have considered it inadvisable to limit his color study to a few color facts which an adult has chosen for him. We have preferred to set forth the data with the general advice that it is to be used as soon as the need for it arises, and we have found invariably that almost every experiment is, in a simple natural way, worked out in Grade I. The young child merely lacks color terminology and is at a loss to explain what he sees. This lack has little to do with eyesight and emotional reactions; so the study need never be hampered nor postponed because of it. A young child has an enthusiasm for color which is a remarkable asset. Any experiment involving color is sufficient to hold his whole attention and to make a deep impression on him.

This book gives fundamental color information in a graphic way that is usable anywhere. If you look back through the illustrations, and the problems listed under Part IV Review, you will find all sorts of suggestions for using the material in the early elementary grades. In the upper grades, the material explains itself. The older child needs the same fundamental color principles that he investigated in Grade I, but these principles are no longer as simple as they were then, because the later experiments have led him to see the many factors that influence every color which he sees. His interest in color has widened to include all sorts of color variations. He may now be interested in the mixture of colors as shown in the three color process of color printing and illustration, or in dyeing or camouflage, or colored lighting for school entertainments, rather than the simple problem of mixing colors from primaries.

WHAT THIS COLOR STUDY INCLUDES.—Seven experiments and an introductory chapter. Also color job sheets and dramatizations.

The introduction relates color study to modern educational developments and shows how the study was developed in one public school system.

There are chapters on Color Materials, Color Job Sheets, and Color Dramatizations and Programs. There are six pages of color reproductions of children's own work and many line drawings to illustrate the test. There is a page of children's written explanations photographed to show how well a primary grade can handle the experiments. These pictures of children's work are typical of the grade in which each child worked. They show the child's own color choices. His color choices are often quaint but always interesting from the standpoint of growth and development.

EXPERIMENT I—*The Source of Color—Light and Pigment.*

EXPERIMENT II—*Color Relations—Like Colors.*

EXPERIMENT III—*Color Contrasts—Unlike Colors.*

EXPERIMENT IV—*Color Mixing.*

Problem 1—*Hues.*

Problem 2—*Light and Dark Values and Black.*

Problem 3—*Dull Intensities and Gray.*

EXPERIMENT V—*Carrying Colors—Color Visibility.*

EXPERIMENT VI—*Color Combinations—The Effect of Colors on each other.*

EXPERIMENT VII—*Color Amounts—Design in Color Choice.*

WHAT EACH EXPERIMENT CONTAINS.—Three Parts; Experiment, Explanation, Review.

PART I—Giving the *directions* for carrying on the experiment.

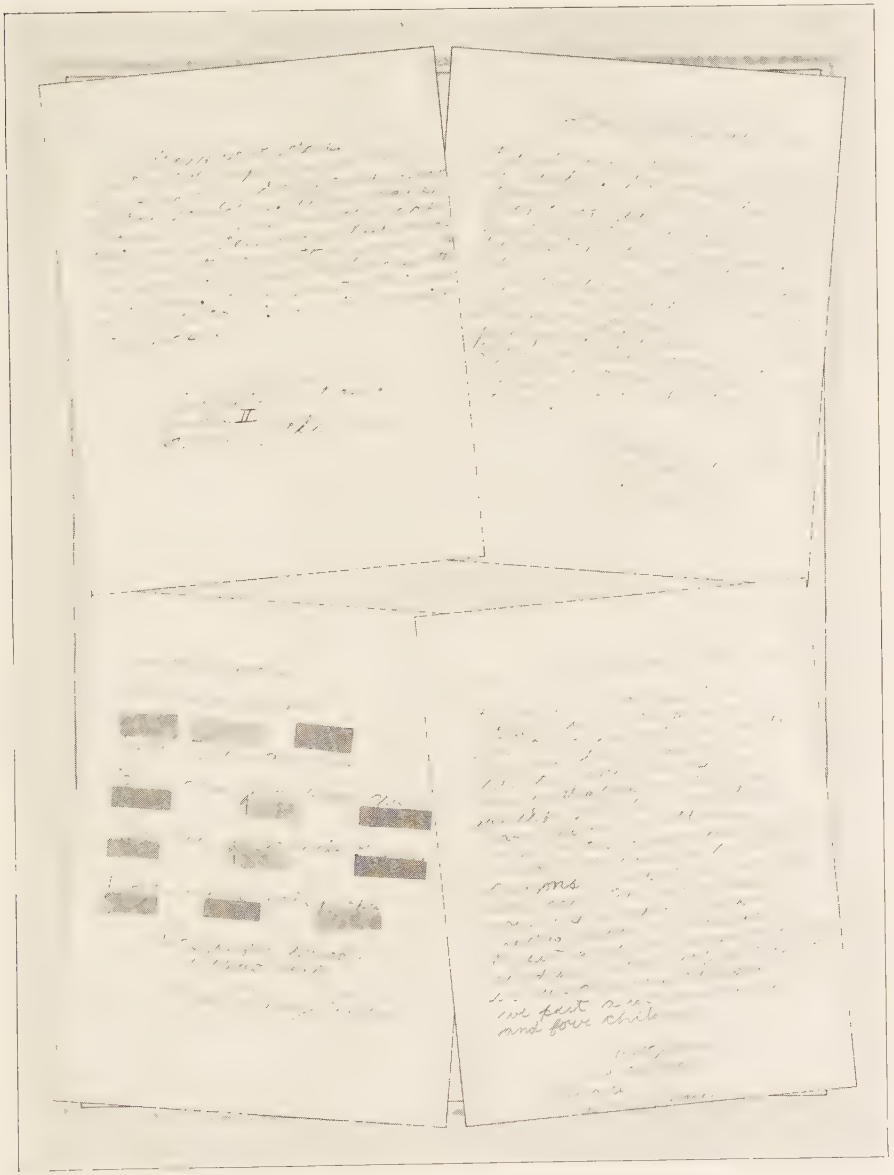
PART II—Giving the *explanation* of the experiment.

PART III—Giving *problems and tests for review* of the experiment.

In brief:

MAKE COLOR TEACHING DYNAMIC.
PUT ACTION INTO COLOR STUDY.
EXPERIMENT WITH COLOR.
JUDGE EVERYONE'S USE OF COLOR.
USE COLOR EVERYWHERE.
MAKE COLOR AS ALIVE AS IT REALLY IS.

If you do these things you can not escape learning a great deal about color. Color will become for you a fascinating treasure house and a useful tool.



Photographs of explanations written by children in Primary Grades. Each explanation tells what the class has found out by experimenting.

Chapter One

Art Education in Relation to General Education.

Of late, some tremendous changes have been taking place in Education. The old days, when teaching the tools of learning, the 3 R's, was the school's sole problem, are no more. Times are changing. Living conditions are changing. Luxuries are no longer luxuries. Distance is no longer insurmountable. People are adjusting to new and vastly different surroundings. Even opinions are changing. Of course, schools are changing. Nothing is sure and set and static anymore, not even Education.

Here we are face to face with the largest problem imaginable and our old ideas of school room procedure and needs are sinking in the sea of change. We are studying Education as a science. We are interpreting modern thinking, modern psychology, modern economic problems in terms of educational practice. We are studying cause and effect—what to teach and why and how. And at last, we are studying children: what their capacities are, how they learn best, how much they retain, etc. We are slowly pulling away from books and printed words as substitutes for experiences and actions. And yet we are using more books, more printed words, and reading is more important to us than ever before.

We are surely coming to see that all children are not alike and cannot be treated alike because they can all be made to sit in straight rows, and in seats of the same size and shape. Individual differences are a much heralded recent idea but we are even now beginning to smile in a superior way because we once thought that all children were alike. Socializing the school room is in general little more than making it alive and real and as informal as the rest of our necessary contacts. We are all learning how, slowly, though sometimes it is harder for us, who have been at it a long while to be natural than it is for the children who are still naturally natural. The changing slant on discipline and the changing appearance of the typical schoolmarm are all hopeful indications that we are ourselves learning how.

Each subject in the school curriculum is undergoing reorganization in the light of modern needs and developments. New subjects are creeping in. Old ones are receiving new emphasis. Each one is being tried out and questioned in the hard light of what it really accomplishes.

Art Education, along with the rest, is changing and getting a new emphasis. No longer is it able to plod along under the name of drawing, and to be taught as a simple rule-of-thumb subject by one who had in years gone by swallowed a textbook on perspective. Neither is it able, any more, to mince along as a highly over-stuffed fad and frill, an ornament to the curriculum and like most ornaments fragile and in grave danger of breaking. It is not even able nowadays to keep itself air-tight and far from contamination in a room apart from all the other school rooms. It just has to come out every time the school wants any sort of advertisement for any sort of purpose from football and playlets to large issues like Better English and Health and Safety and all the other propaganda to help the community.

Art Education today is thoroughly mixed up with and dependent on the rest of the school. It must be so because it is such a useful subject. It has such limitless scope and is ever widening. It appeals to the eye. If you have doubts as to the importance of Art, stop a minute and convince yourself by thinking how much Art choice is involved in modern business, in selling and advertising and as line and color in the com-

modities, the clothing, house furnishings, and what-not that you buy. You cannot get far away from Art. It is hopelessly interwoven in modern living.

Hence, we are all trying to evaluate the field of Art to decide what we should teach in our limited time, with our limited equipment, and our limited period of training. We are slowly building up a subject matter content in Art for which even the most obdurate academic educator will acquire respect. We are studying how to present what we want to put over. We are reaching all children. We are saying with conviction that all children want and can be given certain fundamental art principles and furthermore we are proving it. We have an immense selling job ahead of us, and one which is stimulating to the last degree because it calls for so much initiative and so much comprehension of what is happening. Art is an essential in line with the best educational demands. We must ourselves get in line or we will retard a growth which is inevitable.

Now the danger seems to be that Art people will not be able to go fast enough to keep up with the procession because they have so few guide posts to help them along. There are dozens of fine helps on every other subject—general books, specific books, individual projects, courses of study, etc.—to each one which is available on Art. The 1925 N. E. A. Yearbook Report on the Elementary School subjects showed this clearly. Texts in Art Education, actual facts on how children draw, connections between intelligence and graphic expression, children's preferences for pictures, etc., are few and far between. We have a fine lot of work ahead of us, a wonderful field for someone to cultivate.

The following Study of Color as a part of the subject matter of Art Education deals with methods of presenting color information. It in no way attempts to present any new color facts. It grew out of an attempt to apply modern methods and practices to the teaching of Color.

In the first place, this Color Study shows how to present fundamental color facts as a series of experiments so that each child becomes an actual searching experimenter after facts rather than a passive receiver of information. Each experiment, arranged under Part 1, is a project, a group experience and activity. The explanatory data under Part II comes after the experiment, never before it, and is so simply worded that the child who can read, checks on his own findings. The third section is for review and takes care of the drill, which is so essential if the information is to carry over to every child. Drill has been in partial disgrace since the powerful reaction to so much of it set in. But now we are beginning to look upon it as even more of an essential than before, not as something which someone forces on you, but as something which you yourself know you need and have energy enough to get. Hence, drill is included and in many new guises. You will find it all through this color study as games, dramatizations, charts, diagrams, drawings, rhymes, etc. The slower the group to grasp the information the more of review must there be. Very few of us think in the abstract. Ears are no more useful than eyes. Color is especially adapted to a visual method of study.

Once this useful color information is grasped and made thoroughly familiar, it begins to appear in connection with other school work. It is a fund of material from which to develop oral and written composition, silent reading, spelling and even arithmetic. It helps to interpret geography, literature, history, and the social sciences.

In each of the following chapters appear typical job sheets evolved by the children themselves to explain essential color facts. The job sheets

are written up as experiments because the experimental method has seemed to be the most forceful way of locating and emphasizing the facts. Each experiment is vivid and interesting in itself. It has something of the spirit of adventure and play in it. It calls for little teacher effort.

The experiments differ mostly in method of use. The facts in them remain the same for Grade I or Grade VI or adults. For Grade I the experiments have to be interpreted by the classroom teacher but in Grade V and even in Grade IV the job sheets are read and carried out by the children themselves with little aid from the teacher.

Many times the experiments are carried out as an outside project by a small group of children and later given by them as a demonstration for the whole group. In this case the explanation of the experiment is often written on the blackboard and kept covered from view until the experiment has been finished. This explanation is meant to be used by the child as a check on his own findings and never read until the experiment is all done. The test questions are used by the whole group. The amount of review and drill depends largely upon the age and intelligence of the group and will vary greatly in each case. Schemes for dramatizing the material are discussed and tried out. New problems and color applications taken up until finally there has been enough repetition and review to insure the proper use of these color principles.

Each job sheet is worked out in similar form. Part I always gives the Experiment and Directions for carrying it out. Part II gives the Explanation of the experiment. Part III gives the problems and tests, etc., worked out to review what has been covered. Usually it is best to develop each job sheet in this order, but if you, as a leader, wish to know at the outset what is to be expected from the experiment read Part II first. Reading Part II gives you the explanatory data but it eliminates the element of surprise which is a large factor in each experiment.

HOW THIS COLOR STUDY DEVELOPED IN ONE SCHOOL SYSTEM

There is a thrill just in seeing color! Everyone likes it. Everyone wants to use it. Everyone wants to know more about it. For children it is a really wonderful playground. They never tire of experimenting to see what it can be made to do.

For several years in the Toledo Public Schools we have been making a special drive on color. The art work in our elementary grades is taught by the home room teacher, who, as you well know, has seldom had much art training. Consequently, we could not proceed in our color work in the same manner as if the bulk of our art work were being put over by specially trained art teachers. Yet we wanted results and we were visionary enough to want the results to be as fine as if at the outset, we had had more color knowledge to back up our color enthusiasms.

We all got together and decided, first, that Grade I in using color freely needed practically the same color information as Grade VI. Second, that we could find out while we were using colors just what color information was needed if we took the trouble to watch carefully and jot down typical questions and problems that the children asked. Third, that we could use these questions and problems as "experiments" so that each child could see the answer for himself. If we had each known more about color ourselves, we might have told him the answer and thereby have lost most of the educative value which came from having him find out for himself.

We all went at color with renewed vim. It changed from a

vague, unknown something into an ever-present, much discussed subject. As one humorous older teacher later told me: "Here I used to go calmly around seeing nothing much, but now—why I can't look out of the window without noticing that one tree looks greener than another and wondering why. I can't look any more and not see."

Our first piece of work, to which every wide awake and enthusiastic home room teacher contributed, was to list the queries and problems that arose among the children while they were working with color. There were a startling number of these. They filled to overflowing the particular desk drawer in which I chose to keep them. But when on a certain day, I hauled them forth and proceeded to group all the similar questions, I found to my delight that they easily fell into seven main groups. ONE dealt with questions and problems concerning the *source of color*—light and pigment; TWO dealt with color *relationships* — the likenesses between color or as we call them Color Families; THREE dealt with color *contrasts* — *unlike* colors; FOUR dealt with *color mixing*— how to change the hue, value and intensity of a color; FIVE dealt with the *visibility of colors* — carrying and receding colors; SIX with *color combinations*—the effects of colors on each other when used together; and SEVEN with the choice of suitable *amounts of colors*—design in color.

These natural groupings we used to classify the color facts that we would cover in our study. Each teacher soon had a list of the seven groups with general suggestions for their emphasis in each grade.

We were then all set for our next step—to find our how best to teach these facts in each of the elementary grades. We decided to have the class try the experiment to secure a particular piece of data just as soon as a need for that color information arose. It was thrilling. Soon there were developed all sorts of ways for putting over the color facts. Supervising became an exciting quest. One never knew what one would find, nor where. It came about that teachers who previously had shown no interest at all in any art work were inventing all sorts of fascinating experiments and games and drills.

Particularly was this true in the lower grades. The first year we did little color experimenting below the third grade. The next year a few enterprising teachers were demonstrating how similar data could be handled in Grades I-11. The play element was strong in all these experiments. The excitement caused by actually seeing things happen helped greatly in remembering what happened. Thus the color work spread through all the grades in each building and thence by *special demonstrations* at Group Art Meetings over the entire city.

We soon began to see astounding results of our color teaching. Color came into use in other subjects. We lost all fear of it. We began to know how to handle it and to make it do what we wished. We found that Color Study offered fine stimulus for *Language Work*. Each grade, anxious to pass on its findings to the whole group, wrote up its color experiments in clear and forceful words. That most difficult of *composition* forms—*explanation* succeeded surprisingly when it had behind it all the force of color data that must be told. We heard little of the usual cry of "What will we write about?" *Reading* lessons developed from these little color experiments. The search for interesting *silent reading* found a rich mine of material in these color explanations, for ability to carry out the directions as read furnished a good check-up on the comprehension of the reader. *Arithmetic* number

combinations developed. *Bulletin Boards* grew more vivid. Better *Posters* appeared for all sorts of uses.

We soon were having original *playlets* developed simultaneously all over the city as auditorium stunts until finally there were so many interesting color *dramatizations* that we gathered the most attractive of them together in a *Color Program* given at the Toledo Art Museum on a Wednesday afternoon. Over five hundred school and town people came. Not one act took more than ten minutes, yet each one in an emphatic way put over some definite fact of color relationship, color visibility, color combinations, or color mixing.

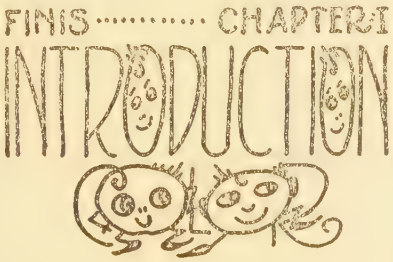
Then came a need for a follow-up drill and review on each experiment in order that all the children might understand and remember. This brought forth an ingenious crop of *color games* and *rhymes* and more *dramatizations*. Later still the children developed their own informational *color tests* and had great fun making up their own questions and springing them on nearby rooms. It was all rather like a big game. It was an active study and consequently became an absorbing part of the week's work.

But at this point there arose an exciting executive problem. Here was all this fascinating color information at large throughout the city. How could we collect it and still preserve its freshness and naivety?

We decided on the following skeleton outline which seemed business-like enough to suit our purpose and yet open enough to allow for variation. We had it mimeographed with wide blank spaces for comments and sent to each grade on request. The outline covered:

1. PROBLEM stating what was to be found out.
2. EXPERIMENT, stating how the information was to be found.
3. EXPLANATION stating why the information appeared as it did.
4. REVIEW giving tests, drills, games, dramatizations and what-not used successfully in reviewing the problem.

The data filled in by each grade gave us the problems, experiments and check-ups which will be explained for you in the following chapters. As you can readily imagine, this data offered quite a complete outline of color information, all of it worked out by the children themselves as the need for the material arose in their everyday work. The material has been tested and revised by other groups of children until now we feel that it is in as finished form as so changing a subject as color can be. The material is not offered as final interpretations of color or of ways of teaching color. It is merely suggestive of a method which may prove helpful. It worked amazingly well in our situation. We can only hand it on with the wish that it may prove of equal value to you.



Chapter Two

COLOR EXPERIMENT I

THE SOURCE OF COLOR—LIGHT AND PIGMENT

To show that color depends on light.

HOW TO FOLLOW IT

This experiment with the prism shows you a little about COLOR and LIGHT and also PIGMENT. It has three parts:
Part I gives the directions and experiment.
Part II, the explanation.
Part III, the review.

1. Read Part I. Carry out the directions. List your own findings.
2. Then read Part II. Compare this explanation with your own findings.
3. Later read Part III. Work out some of the problems and tests.

PART I

TELLING YOU HOW TO DO THE PRISM EXPERIMENT

Collect materials. You need one 3-sided glass prism, a sunny window, at least two keen eyes, drawing paper, and crayons or paints.

Follow these directions: Hang the *prism* (or a glass pendant from an old-fashioned lamp) in the midst of the ray of sunlight. Turn all the keen eyes in the room to what appears on the floor or opposite wall. Look carefully at these colors on the floor and figure out answers to these questions:

What shape is the spectrum?
In what order do you see the colors?
Which color has the most space?
Which color has the least space?
Which color is brightest?
Which color do you like best?

Close your eyes tightly to see if you can remember just how the spectrum looks.

Can you name the colors with your eyes closed?

Compare your crayons or paints with the spectrum colors.

Which are brighter?

Make a picture of the spectrum as you see it. Watch the colors closely and be sure that each one which you make is as much like the original spectrum color as possible. Write the name or the initials of the color under each color.

Next hang the prism in a dark corner of the room. Look carefully to see if you can find a spectrum anywhere there. Now can you answer these questions:

Why is there no spectrum?
What is needed to make the colors appear?
Why are there no colors to be seen on a dark night?
How do colors look on a rainy day?
What colors can you see in the moonlight?
What do we use to take the place of sunlight?

PART II

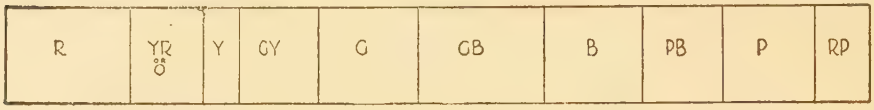
EXPLAINING WHAT THE PRISM EXPERIMENT COULD SHOW YOU

It will spoil your fun in carrying out the experiment if you read this part first. Finish the experiment, then compare your own findings with what this tells you. Consult your dictionary for meanings of the words below which are in italics.

When the ray of bright sunlight strikes the prism it is broken up into the row of pure colors which appears on the floor or wall. You call this row a *rainbow* but people who have studied color call it a *spectrum.* The number of colors varies but in bright sunlight sunlight you can easily pick out pure red, yellow, green, blue and violet or purple, also such

variations as red-yellow or orange, yellow-orange, red-orange, red-violet, blue-violet, blue-green, yellow-green, etc. The pure red of the spectrum which is neither yellow-red nor blue-red is called *standard* Red. The green which is neither yellow-green nor blue-green is called *standard* Green. Instruments have been invented to measure color accurately and they have helped us in locating the Standard colors. *Hue* is another name for color. Here are diagrams of the Spectrum as it may appear in bright sunlight. It is not practical to picture all of the changes in the Spectrum. There are too many of them.

This first diagram shows 10-color changes and gives the color names.



This second diagram shows 12-color changes and names each one.

WHICH WILL YOU USE?

Study the spectrum or your picture of it and you will see that the colors are always in a certain order. One end of the spectrum is made up of *warm colors* such as red, orange, and yellow. The other end is made up of *cool colors* such as green, blue, and purple.

Yellow is a very narrow strip near the middle of the row. In weak sunlight it fades away entirely. The colors which are very much like yellow fade away, too. Only the violet and blue hues are left when the sunlight is very weak.

When there is no sunlight at all, there is no spectrum. You must have sunlight, prism, and good eyes to see the colors well. Sometimes you can see a rainbow made by the sun shining through the raindrops in the sky. Often there is a rainbow showing when the sunlight strikes the spray from the garden sprinkler or in the soap bubbles that you make with a clay pipe.

These bright spectrum colors are pure colors. They are hidden in the ray of light but we need something like the prism to show them to us. We cannot yet paint our houses nor dye our dresses nor print pictures with these pure colors of light so we have made paints and dyes and inks for coloring. These paints and dyes and inks are called pigment colors. They have many materials in them so the colors are never quite as clear as the colors in light. For example, the wax crayons you use every day are full of pigment color but they may also contain a great deal of wax and several kinds of binding materials to hold them in shape. These other materials keep the crayon colors from being as bright and clear as the light colors. Expert chemists are working all the while to make these pigment colors better. They are improving all the time.

There are many ways of making light when the sun is gone. We have progressed from torches to candles, to lamps of whale oil and kerosenes, to gas, and to electricity. Each of these makes a more or less yellow light. This yellow light affects colors seen under it. It makes light blue look like light green. It often makes light purple look like tan or light brown. Pieces of cloth held under different artificial lights will show you this fact.

You may have noticed two other important things while you were talking about the spectrum colors, (1) that you did not all like the same colors, and (2) that the colors did not look the same to all of you.

Each one has his own favorite color though we often learn to like other colors when we have seen them for a long while. We naturally choose the colors that we like best. This is why no two of us ever choose exactly the same colors if there are enough colors to choose from.

There are many people whose eyes are faulty. They do not see certain colors at all. We say that they are *color blind.* The railroad has had to invent careful tests to avoid hiring color blind engineers. There is an amusing old story of a Quaker who was so color blind that one day he came to a Quaker Meeting in a pair of bright red hose. Can you imagine what a color blind salesman of cloth or clothes would do?

Conclusion: From this experiment, you will understand that color is always affected by light. You will think of this when you are choosing colors because the light in which the colors are placed may change the colors a great deal. You have seen that color is a part of light. You have made a picture with pigment color of the pure spectrum. You have learned the names of the spectrum colors.

PART III

SUGGESTING PROBLEMS AND TESTS FOR REVIEWING WHAT YOU HAVE LEARNED

There are two sections to Part III; one lists Problems, the other Color Tests.

PROBLEMS: INVENT GAMES, RHYMES, AND STUNTS. These will help you to remember color names. Here are some games which other children have made up.

1. This Is a Color Name Game:

It helps you to remember color names. Two children play it. The others watch. One child has a piece of colored paper pinned on his back. No one has seen it. The other child is "IT." He tries to see and call out the correct name of the color. Both children keep moving. It is not fair to stand in a corner. If the one who is "it" has not called the correct name in two minutes another child takes his place. A new color is chosen and the game goes on as before.

2. This Is a Guessing Game:

One child shuts his eyes. Another child points to a color on the Rainbow-Picture. The child with the closed eyes tries to guess the name of the color by asking questions: Is it next to blue? Is the color blue-green? etc. The class answers each question: No, it is not next to blue, etc.

3. This Is a Color-in-the Corner Game:

Four groups play it. Each group has a corner. Each child has a color name. One child who is "IT" stands in the center of the room and calls out any two color names. The children whose color names are called try to change corners without being tag-touched by the one who is "it."

4. THIS IS A HEALTH RHYME:

The first verse is:

"Red, ripe and good is my friend the Beet,
Red are the tomatoes we like to eat,
Red are the apples October brings,
Red are our cheeks if we eat these red things."*

Perhaps you can make up other verses till you have one for each of the spectrum colors.

5. THIS IS A COLOR HUNT:

Before school starts hide a certain number of pieces of colored paper around the room. Each piece of colored paper is numbered. Each child takes a pencil and paper. He knows how many colors were hidden. The game is to see who first can find all of the colors of the spectrum, then if he can name each one correctly he wins the game.

6. THIS IS A COLOR GRAB BAG:

Place many pieces of colored paper in a box or bag. Pass the box up and down the aisles. Each child closes his eyes and "grabs" a color. If he can name it accurately he keeps it. If not, he puts it back. See who has the most colors in a certain length of time.

7. THIS COMBINES A NUMBER DRILL WITH DRAWING IN COLOR:

Draw one of something red, two of something red-purple, three of something purple, four of something blue-purple, five of something blue, etc., 'till you have made something to represent each color.

Or you could do it in this way: Draw in its proper color one ripe lemon, two pears (yellow green), three leaves, four pine trees (blue green), five blue birds, etc., etc.

8. THIS IS A RAINBOW MATCH:
(Sometimes we call it a Spectrum Game.)

The children are all in two rows. One child is leader for each row. The game is to make as many rainbows as possible in a certain number of minutes. Each leader starts by saying "I need a rainbow. Help me to make one. What can I use for red?" The first child in the row answers, "a red apple." The leader goes on "for yellow-green?" The second child says, "spring leaves." The game goes on until the time is up. The row which has made the most rainbows wins.

9. THIS IS A COLOR REVIEW:

Each child has a box of crayons. One child asks the question or if the children can read easily the questions may be written on the blackboard. The questions are all similar to those given below. As the question is asked, each child answers it by making a colored mark with his crayon.

QUESTIONS:

What color is a holly berry?
What color is spinach?
What color is a lemon? Etc.

COLOR TESTS

Color Tests: The tests help you to find out how much you have learned from doing the experiment. Use these that are given below, or better still, make up some of your own. Write the following statements on the blackboard, answer them by placing the correct word after the statement. If you are able to have enough copies made so that each one has his own copy it would be best to write the answer in the space following the statement.

1. *True-False Test for Prism Experiment.*

Read the statement. Answer it by writing "yes" or "no." Do not look at your diagram unless you cannot remember.

*Grade I, Washington School, Mrs. Bohlori's class.

1. The spectrum colors are bright colors.
2. We need eyes, a prism and a ray of sunlight to show a spectrum on the floor.
3. Rainbow is another name for spectrum.
4. The colors form a circle on the floor.
5. The colors are in a certain order.
6. The warm colors are at one end.
7. The red color is next to the yellow color.
8. Green is between red and blue.
9. Light is needed to produce color.
10. There is a spectrum when we hang the prism in the dark corner.

2. *Completion Test for Prism Experiment.*

Read the statements. Each blank space represents a word. Place the word which completes the meaning correctly in the blank space. If there is more than one space place the correct word in each.

1. The colors in the spectrum are .....
2. ..... is at one end.
3. ..... is at the other end.
4. The colors are arranged in a .....
5. ..... comes after red.
6. ..... comes after blue.
7. ..... comes after yellow.
8. The narrowest band is .....
9. At one end of the spectrum are all of the ..... colors, at the other end are all of the ..... colors.
10. There are 3 necessities if we are to see a spectrum, (1) ...., (2) ...., (3) ....;

3. *Selection Test for Prism Experiment.*

Underline or write down the word or words which complete the meaning. You may consult your spectrum diagram if necessary.

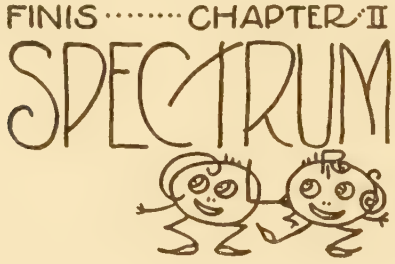
1. The spectrum colors appear in a: square, circle, row.
2. The spectrum colors on a sunny day are: dull, bright, light, dark.
3. On one end are the: warm, cool, dark, light colors.
4. On the other end are the: warm, cool, dark, light colors.
5. Light is, is not, necessary if we are to see color.
6. The colors are, are not, in a certain order.
7. Reading from the left greens come after blue, yellow, red, purple.
8. The color having the narrowest space in the row is: green, orange, yellow, blue.
9. Reading from the left purple comes after red, blue, orange, green.
10. In the dark corner the spectrum could, could not, be made.
11. There are three necessities if we are to see the spectrum: nose, ears, eyes, sunlight, darkness, colored crayons, prism, paper.

For Grade I, the color tests must be more simple and graphic. Here are three simple tests to review the color names. A series of these simple tests can be worked out and used by the children in unsupervised time.

1. Make a red line.
   Make a blue dot.
   Make a yellow ring.
   Put a red dot in a yellow ring.

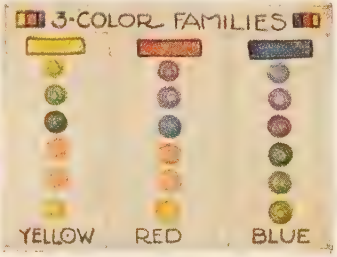
2. Make 2 green lines.
   Make 3 purple lines.
   Make 1 orange line.
   Make 6 purple rings.
   Put an orange dot in each purple ring.
   Put a green line in each purple ring.
   Make 4 purple dots.
   Make 5 orange rings.

3. Make an orange flower.
   Put 4 purple dots in the center of it.
   Make a green stem.
   Make 3 green leaves.



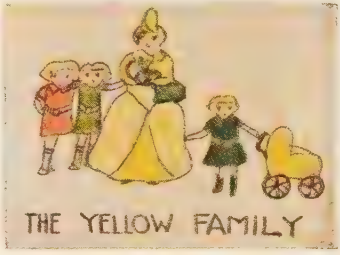
Water Color Paintings by Grades III, IV, V, Washington School—Miss Burchfield's Class.
These were a problem in color mixing. See Color Experiment IV, Chapter V.

The Rainbow Row of Colors Grade II



The Related Color List—Grade V

The Blue Family Group—Grade II



The Yellow Family—Grade V

Opposite Colors—Grade II

Related Colors—Grade II

Crayon drawings made in the classes of Miss Hill, East Side Central, and of Miss Stenson, Lagrange School, to illustrate their Color Study. The drawings represent the children's own interpretations of the color facts investigated by means of the color experiments. These drawings illustrate Color Experiments 1, 2 and 3.

Chapter Three

COLOR EXPERIMENT II

COLOR RELATIONS—LIKE COLORS

To show that certain colors are so alike that they blend together and are easy to use together.

HOW TO FOLLOW IT

The data is divided into three parts:

Part I gives the directions for the experiment.

Part II gives the explanation of the experiment.

Part III gives the Review problems and Tests.

1. Read Part I first. Carry out the directions and answer the questions. Look up new words in the dictionary. List your own findings.
2. Read the explanation under Part II. Compare your own findings with this data.
3. Later work out the problems and tests under Part III.

PART I

HOW TO DO THE RELATED COLOR EXPERIMENT

MATERIALS:

Choose a colored paper to represent each of the colors in the spectrum.

Follow these directions. Set the colored papers in a row using the same color order that you saw in the spectrum. Study this row.

1. WARM AND COOL COLORS:

You soon notice that all the colors on one side are *warm colors* and that all the colors on the other side are *cool colors.*

What are the names of the warm colors? The cool colors?

In between are the colors which are neither very warm nor very cool.

What are their names?

Make a list of two columns giving the warm and cool colors.

2. COLOR FAMILIES:

Another good way to remember related colors is to separate the *color families.* We have three color families because we use three *primary colors* in *pigments.* These primary colors are the three colors which cannot be mixed in pigment. The three color family heads or mothers as we call them are standard red, yellow and blue. Choose papers to represent these three colors. Set them up leaving quite a little space between each one. Then choose a paper to represent each of the other spectrum colors. Place it in the family or families which it looks most like. If you ask yourself these questions, they may help you to decide where the color belongs.

Which family does green (orange, purple, blue-green, etc.) look most like?

Does it look like any other family?

Which family does not look like green at all?

After you have placed all of the colors, count the colors in each family.

Which family has the most colors?

Name the colors in each family.

Can you think of a simple way to remember them?

Make a list of three columns giving each color family. This will be useful information because it tells you at a glance which colors are easy to use together. Half shut your eyes and peek at the colors in the yellow family to see how well they blend together.

In what order do the colors blend best?

Which colors are most like yellow?

Which is least like yellow?

Do the same for the red family and blue family groups. On your color family list, underline or use italics the color which is most like the family and star the color which is least like it.

PART II

EXPLAINING THE RELATED COLOR EXPERIMENT

(Do not read this explanation until you have finished the experiments in Part I. This data is to help you check up on your own findings.)

You see that colors are something like people. Some of them are related and alike, others are strangers and unlike. You have known for a long time that things which have a little in common work together better than those which are very different. If you have doubts of this, try to make as softly blended music with a drum and a violin as you can with two stringed instruments, or try to understand some one who speaks a foreign language. This is why it is useful to remember warm and cool colors and the color families.

1. WARM AND COOL COLORS

The warm colors are the colors which have a great deal of red or yellow in them. The warm colors are the colors which you see in the sun, fire, sunset skies and autumn foliage. The coolest color is blue, so all colors which contain a great deal of blue are called *cool colors.* The cool colors are those which you find in winter skies, ice and deep pools of water. The in-between colors which are neither very warm nor very cool are the greens which contain a great deal of yellow, and the purples which contain more red than blue.

2. THE COLOR FAMILIES

Standard red, yellow and blue are used to represent the three primary colors in pigment. These three colors are known as the Pigment-Primaries, because all pigment colors can be mixed from them by combining them in varying amounts. Each color is related to the colors from which it is made. For example, green is related to yellow and to blue because it is made by mixing yellow and blue pigments. Therefore, green belongs in both the yellow and blue families. Compare the *color families* list with the one which you have just made.

If you are using the 10-Color Spectrum Row omit yellow-orange and red-orange from the list.

WARM AND COOL COLOR LIST

Warm Colors	*In-Between Colors*	*Cool Colors*
Red	Yellow-Green	Blue
Yellow	Red-Violet (Purple)	Blue-Green
Orange, Red-Yellow		Blue-Violet (Purple)
Red-Orange		Violet (Purple)
Yellow-Orange		Green

RELATED COLOR LIST—THE THREE COLOR FAMILIES

Yellow	*Red*	*Blue*
Green	Orange (Red-Yellow)	Purple
Yellow-Green	*Red-Orange*	*Blue-Violet*
*Blue-Green	*Yellow-Orange	*Red-Violet
Orange	Purple	Green
Yellow-Orange	*Red-Violet*	*Blue-Green*
*Red-Orange	*Blue-Violet	*Yellow-Green

The color family list has purposely been made to include only the most necessary color changes. From time to time, as you work with other color variations, you may wish to enlarge this list by adding more color names. In each of the three columns the colors which are most like the color group are in italics. The colors which are least like the group are starred. It will help you to remember the related colors more easily if you make this list so that it gives both a picture of the color and its name. Use crayons or paint or even colored paper to represent the colors in the list. It is important that you make this list accurate for you will use it a great deal whenever you are making a color choice.

3. The Use of Related Colors

Related colors are useful when you wish to choose quiet and restful color combinations. They seem to fade into each other and blend together when you look at them with half closed eyes. This happens because they are so much alike in color.

For data on Related Values, see Experiment V—Color Visibility.

PART III

PROBLEMS AND TESTS FOR REVIEW OF WHAT YOU HAVE LEARNED

(There are two sections to Part III, one lists problems, the other gives some color tests.)

Problems: You can work out Related Color Charts in all sorts of graphic ways by using pictures in place of words to represent the colors. This is great fun and helps you to remember better.

1. Color Family Portraits.

Make a free crayon sketch of Mrs. Yellow, the mother of the Yellow Family. Then draw a picture of the Yellow children, each wearing a dress or suit of the family color. How many children has the Yellow Family? Consult your Related Color List which you made during the experiment. Next draw pictures of Mrs. Red and Mrs. Blue with their families. It is interesting to show the color families at work or at play. Try to make your family quite different from the family which is being made by any of your neighbors. Perhaps later you can appoint a committee to make large painted or cut paper charts of the Three Color families. These large charts can be hung in your own rooms or you can loan them to a lower grade which is not old enough to make such fine ones. Find the illustration which shows the Three Color Families as they were worked out with poster paint by a second grade. They call them "The Color Families at Play." They were made by many children each doing a little toward the whole picture.

On another page are pictures which show how children worked out the Color Families very quickly in crayon.

2. COLOR POLICEMEN.

Fold a piece of practice paper and cut a pattern for a policeman doll. From another piece of practice paper cut a pattern for a captain. Make him fatter and have him wear a taller hat. Dress each captain in a suit and hat cut from either red, yellow or blue paper. Dress the policemen in each of the related colors. Dress them up as much as you wish. Cut faces from manila paper and add eyes, mouths and mustaches of cut paper. Put all of the red policemen under Captain Red, all the yellow policemen under Captain Yellow and all of the blue ones under Captain Blue. Take a large piece of black paper and place the three companies of policemen on it to form a parade. Cut paper letters to say "The Parade of the Color Policemen." Paste these at the top of the black paper. But before you paste your parade on the black paper, be sure to have a real parade of your own. Choose three captains and have each one wear his colors. Have each captain choose his troop. Have each policeman wear his troop's color. See which troop can do the best marching.

COLOR TESTS

Tests: These tests will help you to find out how much you have learned from the experiment. Perhaps you can develop your own set of test questions and try them on the next group which tries the experiment.

True-False Test.—Answer by writing "yes" or "no" after the statement. Use your related color chart and notes if necessary.

1. There are three color groups, or families.
2. They are red, yellow, blue.
3. Red has more colors in its group than blue.
4. All of the greens and purples are in the blue group.
5. All of the greens are in the yellow group.
6. Orange is in the blue group.
7. We placed each color in the family which it looked like.
8. Colors which are alike blend together.
9. Blue-green is in the red family group.
10. Red-purple is in the blue group.

Completion Test.—Complete the meaning by filling in the correct word.

1. There are.....color groups.
2. They are: 1,.....; 2,.....; 3,.....
3. The yellow family has all of the.....and.....hues in it.
4. Red-purple is in both the.....and.....
5. Red-purple is more like the.....family than the.....family.
6. Orange is in both the.....and.....family.
7. Purple is in both the.....and.....family.
8. A color goes in the.....which it looks like.
9. Colors which are alike.....together.
10. The blue family has all the.....and.....hues in it.

Selection Test.—Underline the word or words which complete the meaning.

1. There are four, three, two color families.
2. Red, orange, green, yellow, blue, purple are the family heads.
3. The red family has orange, green, purple in it.
4. The yellow family is made up of green, purple and orange hues.
5. The blue family contains orange, purple and green hues.

"The Red Family Skiing"—Painted Group Poster—COLOR FAMILIES AT PLAY.

"The Blue Family Coasting"
Grade II, Cherry School, Miss Morgan's Class

"The Yellow Family at Play"—Painted by Grade II, Cherry School.

Dolls worked out by children of Grades III and VI during a study of Clothing.
This is a problem which the data on Experiment VII—Color Amounts—will help you to solve easily.

Chapter Four

COLOR EXPERIMENT III

COLOR CONTRASTS—UNLIKE COLORS

To find color opposites and to observe their effects on each other.

This experiment shows you the opposite or unlike colors which are difficult to use together unless you know how to make them HARMONIZE.
Part I gives you the Directions for the experiment.
Part II, the Explanation.
Part III the Review Problems and the Tests.

1. Read Part I first. Carry out the experiment and answer the questions. List your findings.
2. Then read Part II. Compare your findings with this data.
3. Later work out some of the problems and the tests given in Part III.

PART I

TELLING YOU HOW TO DO THE OPPOSITE COLOR EXPERIMENT

Collect Materials: You will need colored papers in all the standard colors, thumbtacks, a neutral background, drawing paper, crayons or paint, and a bright sunny day.

Follow these directions: Place a square of any bright standard color against a background of neutral gray, white, or black. The blackboard makes a fine background or you can pin up a large piece of paper or use the white back of a map.

Look steadily for a few seconds into the center of the color square. Something very strange will seem to happen. The color will waver. It will grow dull or pale. When you shift your eyes to focus them on the neutral background you will see another color. This is the opposite or complementary color. It will not be at all like the original color. Each one will see this after-image a little differently but if you look long enough most of you will see the same color. If you look at red, what color appears?

Try this experiment until you have discovered the opposite to each standard color. Can you think of reasons why this color change occurs? Make a list giving each color and its opposite.

Place each color and its opposite side by side to notice how they affect each other. Compare them with a pair of closely related colors. Notice how the opposites seem to separate and to make each other appear brighter.

Answer these questions. They will help you to understand what happens while you are looking at the bright color.

Why is a neutral background necessary?

What sort of light is best?

Can you suggest helps for those who have difficulty in seeing the opposite color?

Can you see the opposite to a light color like pink?

How does it look?

What shape is the opposite color which you see?

Did you see other colors before you saw the opposite?

What were they?

Why do some of you see the opposite colors sooner than others?

Had you ever before seen an opposite while looking at a color?

Why are opposite colors difficult to use together?

PART II

EXPLAINING WHAT THE OPPOSITE COLOR EXPERIMENT HAS SHOWN YOU

If you read this part before you have finished the experiment, you will lose most of the fun for it tells you just what happens. This part is meant to be used as a check on your own findings. Look up the italicized words in the dictionary.

For each color there is an *opposite* or *complementary* color which completes the color sensation. Mixed together in pure color lights these two opposite colors produce *white*. Mixed together in pigments they produce a *neutral*—such as gray or black. White, black and gray all show a balance of color. The colors which make them are so balanced that all color is absorbed as in black or reflected, as in white.

The opposite color always appears when the eyes are weary of the original color. This is nature's way of resting the eyes. Without it we might be blinded by color. Some people are *color-blind*. Their eyes are faulty. They are not sensitive to certain colors that normal people see. Have you ever known such a person? There are many funny stories about people who are color-blind and make ridiculous mistakes in choosing colors. There have been some tragedies, too, because of color blindness. There was once a great railroad wreck because a color blind engineer read the signals wrong. Nowadays, the railroad has color tests for its employees who have to read signals. People are most often color blind to the red and green hues. Men are more often color blind than women.

The background against which the bright color is placed must be *neutral* or it will affect the color which you see. The opposite color may be the same shape as the original color or it may appear in a ring or as a blur of color. The opposite color always appears if you look long enough, but some of you may have trouble in keeping still long enough to see the opposite color. The original color seems to grow pale, then gray, and finally a ring of the opposite color comes around the edge.

If you are looking at bright red, the opposite color is of a green *hue*. If the red is slightly yellow then the green is more blue in color. But if the red is slightly blue or violet-red then the green is more yellow in color or yellow-green. Yellow is opposite a violet hue. If the yellow is slightly green then the opposite violet is tinged with red. But if the yellow is slightly red or orange then the opposite violet is more blue. Blue is opposite an orange hue. If the blue inclines toward green the opposite color grows more red. But if the blue inclines toward violet the opposite orange grows more yellow. Check your findings to see if they agree with these statements.

With your paints mix a little of two opposite colors and see what happens. If you add the right amount of the opposite color you will have a neutral gray. If you add only a little of the opposite color you make the original color dull.

Opposite colors are so bright and strong that they are difficult to use unless you have learned to make them *harmonize*. A safe and easy rule to remember is *always to use bright colors in small amounts*. This rule applies especially to bright opposite colors. Always use them in small quantities and (1) either combine them with a large amount of neutral color (black, white or gray) or (2) dull one of them by mixing it with the other or (3) make one of them lighter or darker than the other. These three points are very important to remember because

opposite colors if used carelessly clash and are very noisy.

Noisy colors, like noisy people, are tiring. They vibrate. They separate. Each one calls loudly for all of the attention. But often a very little of an opposite color is needed to give more variety and life and force to a quiet color combination. It is well for you to learn how to control noisy colors. You can soon learn to make them fit into place and harmonize with their surroundings.

Conclusion: From now on, we hope that you will try to make the opposite colors fit into place and remember to use them carefully and sparingly.

OPPOSITE COLOR LISTS

The color names are arbitrary. They are often listed as follows:

10-COLOR LIGHT THEORY	12-COLOR PIGMENT THEORY
The COMPLEMENTS are:	The COMPLEMENTS are:
Yellow—Purple-blue	Yellow—Violet
Green—Red-purple	Blue—Orange
Blue—Red-yellow	Red—Green
Purple—Green-yellow	Yellow-orange—Blue-violet
Red—Blue-green	Red-orange—Blue-green
	Red-violet—Yellow-green

For data on Contrasted Values, see Experiment V, Color Visibility.

PART III

PROBLEMS AND TESTS FOR REVIEWING WHAT YOU HAVE LEARNED

(There are two sections to Part III, one lists problems, the other gives some color tests.)

Problems: Draw pictures. Pictures are often easier than words to remember. You can work out Opposite-Color Charts in many graphic ways to help you to remember the facts. Maybe you will be interested in seeing what some primary grades wrote of their experience with this experiment.

Explanation:

Grade I, Newbury School

1. "Miss Lawler stood at the front of the room. She held a small piece of red paper against a large piece of gray paper. We all looked straight at the center of the red paper. The red color began to move. We 'squinted' our eyes and we saw blue-green around the edge of the paper. We took our crayons. We made a red and a blue-green square side by side. We think this will help us to remember that these colors are not alike.

"In the afternoon, one of the children held up a small yellow paper. We looked and saw blue-purple. We put yellow and blue-purple squares below our red and green squares.

"Next day, someone else held up an orange paper. We looked and saw blue around it. We put a blue and orange square under the others on our paper. We are keeping our papers to look at, if we forget."

Jingles, Grade II, East Side Central

2. "Miss Hill set a piece of red paper in the chalk tray. The blackboard was clean and black behind it. We looked hard at the red paper. We half shut our eyes. We kept our eyes on the red paper for quite a little while. Then we looked up at the blackboard. Some of us saw a bright blue-green spot. It was square like the red. Some of us

could not see it at first. We had to look longer. We took our crayons and made crayon pictures of each pair of opposites. We saved this list.

The next day in our language lesson, we took our list and made some jingles. We made a jingle for each pair of opposites. Here is one of them. It is about blue and orange.

"Bright blue and orange find it hard to agree,
They jump far apart, as you can see.
But violets and greens are friendly in hue.
Because as you know they are related to blue."

Look on the page of color illustrations in front of Chapter III and you will see two drawings, which were made as pictures for this jingle.

Color Flowers, Grade III, Webster

3. Here are some drills worked out by Grade III, as a language lesson. The directions were later used as silent reading material. You can work out similar directions for each of the other opposite colors.

Make a red flower.

Put a blue-green stem on it.

Make three blue-green leaves.

Take the black crayon and outline the flower and leaves.

Draw black veins in each leaf.

Put black dots in the center of the flower.

Make green grass below.

Letter above. "Opposites need black."

4. This stunt helps you to remember the Opposite Colors.

Paste each of the Standard Colors on a cardboard about 4"x4" in size. Use these as flash cards. Show a color; name its opposite, etc. See how quickly and accurately the whole room can do this.

5. Make a color wheel to hang on the wall of your room. Make it of paint or colored papers. Make it large. A color wheel will help everyone to remember the color facts. You will like to refer to it when you choose colors.

COLOR WHEELS

A Color Wheel helps in remembering color facts. If you are not using a color wheel, you will want to work one out. You have seen that the rainbow or spectrum row, cast on the floor by a prism hanging in a ray of sunlight, is made up of many brilliant colors arranged in a certain order.

If you make a picture of the spectrum band, showing ten color divisions you will have the beginning of a Ten-Color Wheel. If you make a picture showing twelve-color divisions, you will have the beginning of a Twelve-Color Wheel. To make a Ten-Color or Twelve-Color Wheel follow these directions.

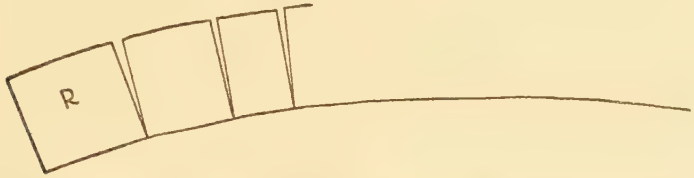
TEN COLOR SPECTRUM

R	YR	Y	GY	G	GB	B	PB	P	RP

TWELVE COLOR SPECTRUM

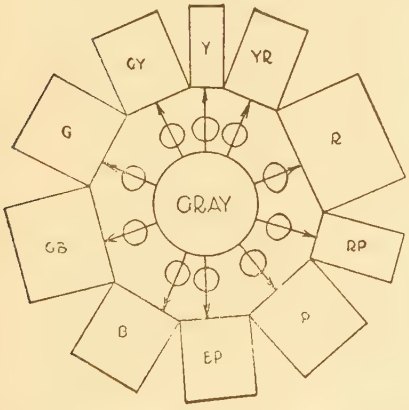
RED	RED-ORANGE	ORANGE	YELLOW ORANGE	YEL-LOW	YELLOW GREEN	GREEN	BLUE GREEN	BLUE	BLUE VIOLET	VIOLET	RED VIOLET
1	2	3	4	5	6	7	8	9	10	11	12

1. Here are the two spectrum rows. Work out whichever spectrum row you wish to use. Make it of colored paper or color it with crayons, transparent water colors, or poster paints.
2. Next with your scissors, cut the colors almost apart like this:

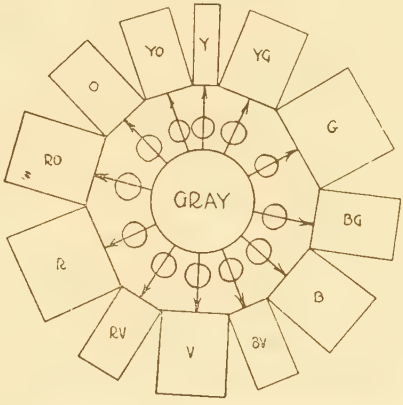


3. Now bend them into a circle. You will find that the opposite colors are in their proper positions. The color names violet and purple are used interchangeably.

10-Color Wheel



12-Color Wheel



4. If you add gray to the center, and an inner ring of gray or dull colors, you will have a complete wheel.

The color wheel shows you opposite (complements) and related (neighboring) colors. Often color wheels are made with red at the top of the wheel. Many people prefer this. If you do, you can easily shift the colors around without affecting the experiment. Sometimes the warm colors (orange and red) are put at the right of the wheel and sometimes the cool colors (green and blue) are put here. The colors are usually read clockwise, i. e., toward the right, and so on around the circle.

TESTS

Tests: Perhaps for this Opposite Color Experiment you will be able to develop your own tests. Look back at the tests on the preceding experiments and work your own questions as a class language problem. You will want to choose questions that will help you to remember the most important facts. If you have difficulty in wording the questions here are some suggestions.

Suggested Type of True-False Test.—Write "yes" after each true statement. Write "no" after each false statement.

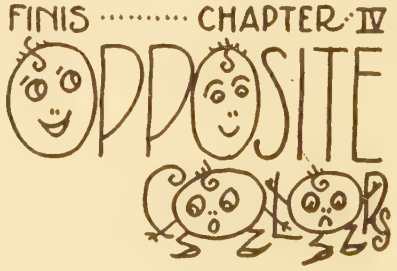
1. A green hue can be seen after looking at bright red.
2. Orange makes us see blue.
3. Yellow makes us see red.
4. The opposite color which we may see is called an after-image.
5. It appears because our eyes are rested.
6. It appears sooner and brighter in strong sunlight than in a darkened room.
7. Bright blue has some orange in it.
8. This experiment works best if tried on a dull day.
9. Some people are color blind.
10. The opposite colors are not at all alike.

Suggested Questions for Selection Test.—Underline all the words which complete the meaning correctly.

1. The color which appears when we stare at yellow is blue, blue-green, purple-blue, purple.
2. When our eyes grow tired of red we see blue, blue-green, orange, green.
3. Blue is opposite yellow, red, orange, red-purple.
4. Green is opposite red, blue-purple, yellow, red-purple.
5. Purple is opposite green, yellow-green, orange, yellow.
6. The opposite color is seen because our eyes are rested, tired, dark, strong.
7. This experiment works best on days which are sunny, dark, cloudy, dull.
8. The opposite color looks dark, bright, light in color.
9. Other names for the opposite colors are neighboring, contrasted, unlike, like, related, complementary.

Suggested Type for Completion Test.—Fill in the word which completes the meaning correctly.

1. Yellow is opposite .....
2. Blue is the color which appears when we look too long at.....
3. ..... is opposite red.
4. Green appears when our eyes grow tired of .....
5. ..... is opposite yellow-green.
6. The opposite color appears because our eyes are .....
7. The opposite color ..... our eyes.
8. The experiment works best on a ..... day.
9. Opposite colors are .....
10. People who see no color are said to be ....
11. People are most often color blind to the opposite colors ..... and .....



Chapter Five

COLOR EXPERIMENT IV

COLOR MIXING WITH PIGMENT

To show how color variations are produced with pigment.

This experiment shows you how to mix your own colors. It contains three different problems:
PROBLEM I shows you how to change the HUE of a color.
PROBLEM 2 shows you how to vary (the value) the amount of light in a color by making it lighter or darker.
PROBLEM 3 shows you how to make a bright color dull and how to mix gray.

1. First read the directions for the problem which you need. Follow the directions carefully.
2. Then work out some of the extra problems and try the tests to see if you remember what you have found out.
3. The extra problems suggest easy ways to give the same color facts to children in the Primary Grades.

PROBLEM I

TELLING YOU HOW TO CHANGE THE HUE

PART I-II—DIRECTIONS AND EXPLANATION

You may already know that Red, Yellow and Blue are called *primary colors* in *pigment.* Look up the word "primary" in your dictionary and see if you can tell why Red, Yellow and Blue are called the Pigment Primary Colors. Also look up the word "pigment." Why are paints called Pigment? What does *"hue"* mean?

Now take a clean brush and the three primary colors and follow these formulas to see what happens. You can use the same rules for mixing dyes, crayons and all sorts of pigment colors.

1 part BLUE mixed with 1 part YELLOW makes GREEN.
2 parts BLUE mixed with 1 part YELLOW makes BLUE-GREEN.
1 part BLUE mixed with 2 parts YELLOW makes YELLOW-GREEN.

Or very often the formula is made short like this:

1 B. + 1 Y=G 2 B. + 1 Y=BG 1 B. + 2 Y=YG

This formula shows that green can be made from blue and yellow paint and that blue-green or yellow-green can be made by varying the amounts of Blue and Yellow color. Mix several different blue-greens and yellow-greens. Why are all greens related to each other?

Now you are ready for another formula:

1 part BLUE mixed with 1 part RED makes VIOLET (PURPLE).
2 parts BLUE mixed with 1 part RED makes BLUE-VIOLET.
1 part BLUE mixed with 2 parts RED makes RED-VIOLET.

Mix several more variations of blue-violet and red-violet. Why are all the purples related closely to each other? Near the sample of color which you have just mixed jot down the abbreviated formula telling how you did it. For example:

1R+1B=V 2R+1B=RV 1R+2B=BV

You have found out how to mix green and purple, here is the formula for orange:

1 part RED mixed with 1 part YELLOW makes ORANGE or RED-YELLOW as it is sometimes called.

Can you make red-orange and yellow-orange? Write the abbreviated formula by each of your samples.

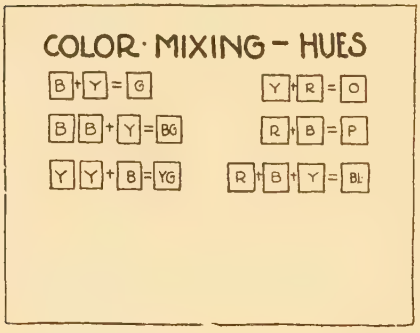
Try mixing all three colors together to see what happens. Use this proportion: 1 R + 1 Y + 1 B= —? If you get the proportions exactly right the resulting mixture will be *black* but you may only get a muddy color not as dark as black. Anyway if you mix all three of the Primary Colors together you always get a neutral, "colorless" color and if the proportions are just right you will have made black.

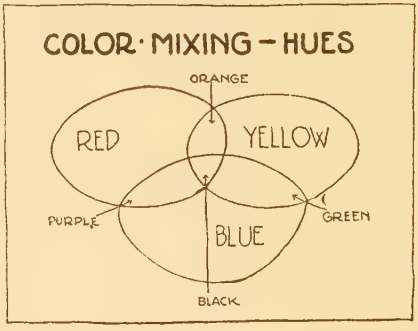
When you have all finished the experiment maybe a few of you will offer to make a large wall chart to show what you have learned about these color mixtures? A good way is to cut out pieces of the color which you have made and to mount them on charts like the one given at the left below:

COLOR MIXING CHARTS

These diagrams show you how to mix hues.

Use a neutral gray background paper and paste at the top this title cut from white or black paper: *"Color Mixing-Hues."*





You know that Red, Yellow and Blue are called Primary Colors in Pigment. Primary comes from the Latin word "primus," meaning first. Can you explain why Red, Yellow and Blue are given this name? Sometimes the mixed colors orange, green and purple are known as Binary or Secondary colors. Can you explain why? Yellow-green, Blue-green, Red-violet, etc., are often called Tertiary or Intermediate Colors. We have purposely omitted these large words because we feel that they are not very important for elementary school children to remember.

Part III—Extra Problems and Tests for Review

PROBLEMS: These extra problems in color mixing will help you to review the experiment. They suggest easy ways of showing what you have discovered about color mixing facts. Perhaps you will want to appoint a committee to demonstrate your points to the little children in Grade I.

1. COLOR MIXING STUNT USING PAINT OR DYE:

Mix the three primary colors, Red, Yellow and Blue, with a lot of water in three separate glasses. Have at least three extra empty glasses. Combine any two of the primary colors by pouring an equal amount of each into an empty glass. You

will have made the mixed color orange, green and purple. Make blue-green, yellow-green, etc., by using two-thirds of one primary color and one-third of the other. Make all the colors which you saw in the Rainbow. Set the glasses in the spectrum order.

2. Color Mixing Stunt Using Tissue Papers:

Choose three sheets of tissue paper, one of standard red, one of blue, and one of yellow. Place any two, one above the other, against the window pane. Maybe you will have to use twice as much yellow because yellow is such a light color. You can make orange, green, and purple in this way. Try to make red-purple by adding another sheet of red to the blue and red combination. Make each of the standard colors. Design some window transparencies or a window color wheels of odd shapes to show these colors.

3. Color Blending with Paints:

Fancy papers for covering gift boxes can be made quite easily with water color paints.

(a). Wet a piece a manila drawing paper. Choose two primary colors. Put a big spot of each one on the wet paper. Tip the paper so that they will run together. Take a brush and help the colors to run together if they do not do it when you tip them.

(b). With a wide brush daub streaks of brilliant color (perhaps yellow and blue) in alternating bands on a piece of manila drawing paper which has been thoroughly wet. Cover the whole surface of the paper. Crumple the wet paper by crushing it tightly in one hand. The bands of paint will mix in most unexpected ways and form an irregular pattern of color on the paper. In the wrinkles where the paper has been broken the paint will probably be darker, thus forming a hazy network of lines.

4. Color Mixing Game Invented by Grade II:

One child says to another, "I am yellow. Help me to make green." Another child answers, "I am blue. I will help you to make green." Then the child who has answered correctly asks a similar question of another child and the game goes on.

5. Mixing the Color Wheel:

Mix all the colors for the outer ring of the Color Wheel using only Red, Yellow and Blue paints or crayons. You will have learned how to make each one of the colors if you did the experiment. Place yellow at the top of the wheel. Refer to the opposite color list made in Experiment III to find out which colors are opposite on the wheel.

Mixing the Spectrum Row using only Red, Yellow and Blue paints. Make all the colors of the rainbow using only the three primaries.

Mixing the Color Families: Make each of the color families using only Red, Yellow and Blue paints or crayons.

6. Look at a Colored Illustration in a magazine through a small microscope or lens. Notice the dots which make up the colored areas. If the illustration is made by the 3-color process you will be able to pick out the blue and yellow dots where the picture appears green. What color dots can you see in the orange areas? In the purple?

7. Matching Colors:

Try to match with crayons or paints the colors found in the children's clothes, the furnishings of the schoolroom, pictures, flowers, fruits and leaves.

8. Marbled Oil and Water Paper:

Choose any two primary colors in oil paint. Thin with turpentine until paint is light enough to float on surface of shallow pan of water. Spatter some of each color on the water with a brush. Take a sheet of

paper rough in texture and press it against the floating paint. The colors will mix and make lovely "marbled" and "mottled" effects. How do printed marbled papers differ from these hand made ones? (Printed papers are blank on the back side.) This paper makes a beautiful covering for gift boxes, lining papers for portfolios, memorandum pads, greeting cards, etc. Fine effects can also be secured by using light and dark values of paint or by mixing opposite colors. Find the portfolio on page — color illustration which shows lining papers of this hand-made marbled paper.

9. TIED AND DYED CLOTH:

This is a simple process used for putting pattern on cloth. Take any 2 primary colors in dye. Follow directions for mixing the dye baths. Take a white handkerchief or any small piece of white cotton or silk cloth. Pull the cloth up to a point in the center, wind and tie string tightly around the cloth like this:

CLOTH FOR HANDKERCHIEF -- PULLED TO A POINT--TIED WITH STRING

Dip tied handkerchief in one color of dye. Tie up new places and untie the original ones. White rings appear where the strings were tied. Dip in the second dye bath. The background is a mixed secondary color. The rings are of the two primary colors. This process also works well with light and dark values of one color and with opposite colors if a gray or dull background is desired.

10. BATIKED PAPER OR CLOTH:

Have a small dish of hot wax and a brush for spreading it, also a shallow pan containing a dye solution of any desired color. Suppose you choose to make a piece of batiked wrapping or lining paper. You have selected a sheet of bright yellow poster paper to work on. With a brushful of hot wax, "paint" a large free pattern on the surface of the paper. Lines relieved by dots and circles make an effective and simple pattern. Small complicated units repeated over the surface form lovely patterns but require much more time and skill.

When the wax is cold dip the piece of paper into the dye bath. The dye must be cold for hot dye would cause the wax to melt and destroy the pattern.

If you are using a blue dye bath, the yellow background of the paper becomes green. The paper is next placed between many thicknesses of newspaper. The wax is removed by pressing with a warm iron.

The finished paper shows a clear yellow pattern against a green background. Try other colors of paper in the same dye. Simple patterns or initial letters may be put on handkerchiefs in the same way. Paint in the pattern or initial with hot wax. Dip the dye in a dye bath. Remove the wax with a hot iron and the thing is done.

QUESTIONS FOR REVIEW

1. If you could have only three colored crayons, which three would you choose and why?
2. What two colors do you need to make orange if you have no orange crayon? Purple? Green? Yellow-green? Red-purple? Blue-purple? Blue-green, etc.?
3. How can you tell yellow-green from green? Blue-green from green? Blue-green from yellow-green? Purple from yellow-purple, etc.?

4. If you have a green crayon, what color do you need to make a yellow-green color? A blue-green color? If you have a purple crayon what color do you need to make a red-purple? If you have an orange crayon, what color do you need to make a yellow-orange color? A red-orange color?

Tests on Color Mixing Facts.

These tests were developed to find out how successful the informational lesson has been and how much need there is for drill. Perhaps you will prefer to work out your own test questions to try on each other.

True-False Test.—Write "yes" after each correct statement. Write "no" after each false statement.

1. We use red, yellow and blue to make many other colors.
2. We found that red and yellow make orange.
3. We found that more red and less yellow make green.
4. We used the blue and red crayon to make purple.
5. We made red-purple by using more blue than red.
6. We mixed yellow and blue to make green.
7. We used more yellow than blue to make yellow-green.
8. We made green into blue-green by adding more blue.
9. We found that red and yellow and blue would only make two colors.
10. We can tell yellow-green from green because it looks more like yellow than green.
11. What we have found out today is true for crayons, paints and dyes.

Completion Test.—Fill in the word which completes the meaning correctly.

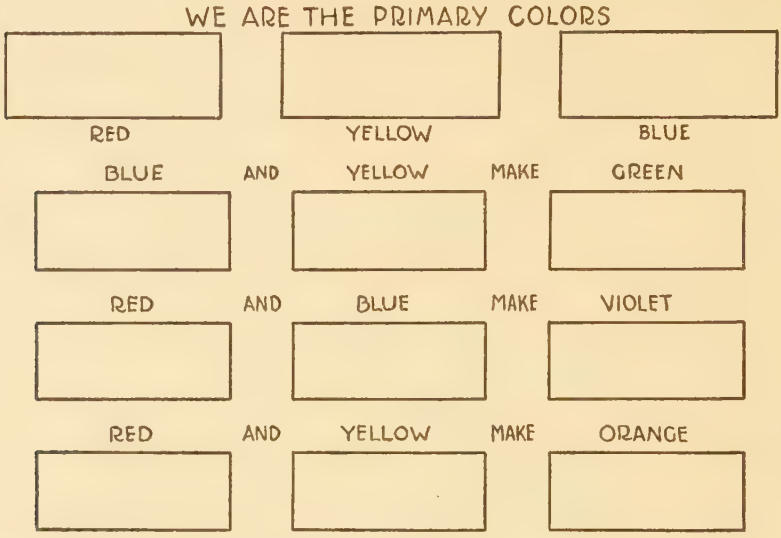
1. Red and yellow make .....
2. ..... and red make purple.
3. More red and less blue makes .....
4. ..... and blue makes green.
5. More ..... and less ..... makes blue-green.
6. If you could have only three crayons which three would you choose 1....., 2....., 3.....?
7. If you have a blue crayon you need ..... to make a green.
8. A ..... crayon is used with the purple crayon to make a blue-purple color.
9. Red-purple is more like ..... than red.
10. Red and blue have no ..... in them.
11. Crayons, paints and dyes are called .....

Selection Test.—Underline the word which completes the meaning correctly.

1. Green is made by mixing blue and red, yellow, orange.
2. Blue, yellow and red will make purple.
3. We make red-purple by using less yellow, green, blue, orange than red.
4. If we mix yellow and red we have—blue, red-purple, green, orange.
5. If we mix more yellow than blue we have—blue-green, green, yellow-green, purple.
6. We need 3 colors, red, yellow, green, purple, blue, orange to make all the other colors.
7. Blue-green is made by adding blue, yellow, red to the green crayon.
8. If you have a blue crayon you will need red, orange, yellow to make blue-green.
9. Crayons, paints and dyes are pigments, lights.

GRADE I TEST

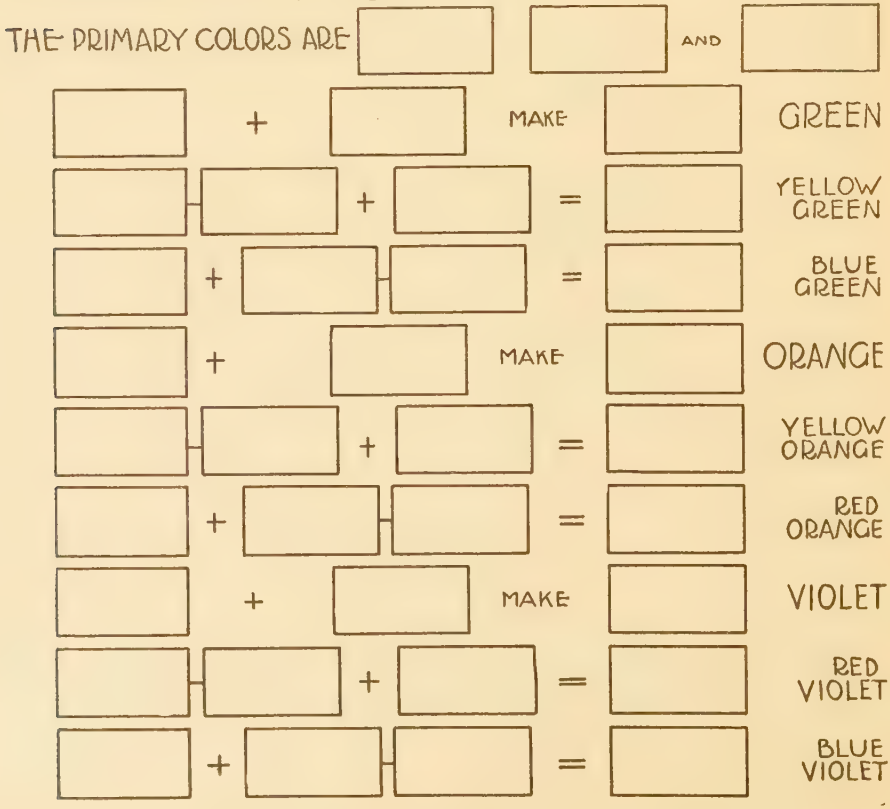
Here is a Color Mixing test used in Grade I to check up on the information in this experiment. The material was developed as a group language lesson to explain what they had just done, used as a reading lesson when written on the blackboard, and finally as written work during an unsupervised period.



GRADE IV TEST

Here is a Color Mixing test used in Grade IV. It is similar to the one used in Grade I. It shows you how to mix many different hues.

Fill in the blocks with crayon or paint.



PROBLEM II

SHOWING YOU HOW TO MAKE A COLOR LIGHTER OR DARKER

This change from light to dark is called a change in value. It deals with the amount of light in a color. Light colors are called tints, dark colors are called shades.

Part I—Giving the Directions for the Experiment

Choose any bright color and black and white. Use water in place of white in working with transparent watercolors or dyes. Follow the formula carefully and make at least 3 light values and 3 dark values of the color.

Light Values

1 part of any Standard Color mixed with 1 part White makes *Light Color,* a tint or light value.

1 part Standard Color mixed with 2 parts White makes *Lighter Color.*

1 part Standard Color mixed with 3 parts White makes *still Lighter Color,* etc., indefinitely.

Dark Values

1 part Standard Color mixed with 1 part Black makes *Dark Color,* a Shade or dark value.

1 part Standard Color mixed with 2 parts Black makes *Darker Color.*

1 part Standard Color mixed with 3 parts Black makes *still Darker Color,* etc., indefinitely.

Cut out pieces of each of your samples of tints and shades and use them to make a vertical or horizontal scale of light and dark values.

Perhaps some ambitious group will work out a large chart to hang where everyone can study it.

WHITE	LIGHTEST COLOR	LIGHTER COLOR	LIGHT COLOR	STANDARD	DARK COLOR	DARKER COLOR	DARKEST COLOR	BLACK
	TINTS				SHADES			

Part II—Explaining the Experiment Which Showed You How to Vary the Values of Colors

Light is usually said to be white. Some colors such as yellow naturally have a great deal of light in them. This is why yellow is always much lighter than purple which has little light in it.

We have learned to make colors lighter or darker as we wish by adding to them white or black. Mixing any color with white adds light to the color. Likewise, mixing any color with black absorbs light from it and makes it dark. White is what we see when all color is reflected. Black is what we see when all color is absorbed.

Contrast in Light and Dark makes colors show up well. Light colors are easily seen against dark ones and vice versa. We call all light values *tints* and all dark values *shades.*

Every color has an endless number of these light variations each one a little lighter than the other until at last all color is reflected and you see no color at all, nothing except white. Every color has an endless number of dark variations, each one a little darker than the other until at last all color is absorbed and you see only black. Do you remember how you made black by mixing all the colors together?

Part III—Suggesting Problems and Tests for Review

You can easily work out your own problems and tests similar to those suggested under Problem I, "Mixing Hues."

PROBLEM III

SHOWING YOU HOW TO MAKE A BRIGHT COLOR DULL AND HOW TO MIX GRAY

This change from bright to dull color is called a change in intensity.

Part I—Giving Directions for the Experiment

Choose any bright standard color and its opposite in paints. Follow this formula and see if you can get approximate results.

1 part Bright Color mixed with 1 part Opposite Color makes NEUTRAL GRAY.

3 parts Bright Color mixed with 1 part Opposite Color makes DULL BRIGHT COLOR.

2 parts Bright Color mixed with 1 part Opposite Color makes a DULLER BRIGHT COLOR.

1 part Bright Color mixed with 2 parts Opposite Color makes a DULLER OPPOSITE COLOR.

1 part Bright Color mixed with 3 parts Opposite Color makes a DULLER OPPOSITE COLOR.

And so on indefinitely. There are an endless number of dull variations. Be sure that some one in the class experiments with each pair of opposites.

Cut oblongs from these samples which you have mixed and arrange them in a horizontal band like this:

BRIGHT COLOR	DULL LIGHT COLOR	DULLER LIGHT COLOR	DULLEST LIGHT COLOR	NEUTRAL GRAY	DULLEST OPPOSITE COLOR	DULLER OPPOSITE COLOR	DULL OPPOSITE COLOR	OPPOSITE COLOR

Part II—Explaining the Experiment Which Shows You How to Make Bright Colors Dull

Do not read this explanation until you have completed the experiment. Find the exact meanings of all new words by looking them up in your dictionary.

Any bright color can be made dull by mixing it with its complement or opposite color. This process is often called *neutralization.* In certain proportions the bright color and its opposite will produce *neutral* gray. In the formula we have written this proportion as half and half but when you mix the two colors in paint you may have to vary the proportion in order to make a perfect looking neutral.

Gray always results from the exact balance of two opposite pigment colors. This is because any two opposite colors contain some of each of the three primary colors and represent a balance of color. For instance, orange and blue are opposite colors which, mixed together in exact proportions, make a neutral gray. Orange is made from red and yellow: Therefore, orange added to blue gives a mixture of the three primaries, red, yellow and blue. Figure this out for the other pairs of opposites.

This is why gray is a restful color which goes with all colors. When you add the opposite color to a bright color you relate the two colors and make them more alike. This is why dull colors are easier to combine than bright ones. Can you explain why dull blue goes better with orange than bright blue?

Part III—Suggesting Problems and Tests for Review of Problem 3

Problems: *Develop your own Review Problems similar in type to those given under Problem I "Color Mixing."*

1. To Make a Color Wheel:

As a group project work out a large color wheel, preferably in paint, but cut paper is easier and will do. Make it with an outer ring of bright colors, an inner ring of dull colors and a center of neutral gray. Place yellow, which is the lightest color or red, which is the brightest color, at the top. Be sure that the color opposites are correctly placed. On page 37, are diagrams of the two color wheels which are now widely used.

2. To Dull Colors With Tissue Paper.

Take pieces of colored transparent paper representing the ten colors of the color wheel. Place the opposite colors one on top of the other. Hold them up against the light (window pane) and note the effect.

For example, bright orange tissue paper held up to the window over blue tissue paper dulls the blue and makes it appear grayed. If the orange is exactly the right orange, it will entirely neutralize the blue, i. e., make you see gray, but if the orange is a yellow-orange it will give the effect of dull green or if it is a red-orange it will give the effect of dull purple. Why is this so?

Try the experiment with the other opposite colors. Try the experiment by putting two thicknesses of the orange tissue over one of the blue. What change is there? Try the effect of putting the blue on top of the orange. How is this color different from the color made when the orange was placed on top?

How are effects like this used in clothes? (Chiffon, tulle and other thin materials used over heavier satins and silks; thin cheese cloth tie-dyed and used over bright colored sateens, etc.) In colored glass? In home furnishing? In woven goods? (Plaids, checks and fancy weaves made by using a warp thread of one color and a woof or weaving thread of another. This sort of material is often found in men's clothes and in woolen goods.)

3. To Tie and Dye Using Opposite Colors.

Mix up in separate containers a blue and an orange dye. Any commercial dye is satisfactory if you follow carefully the directions for mixing which are always given on the package. The soap dyes, especially the fast dyes put up in soap cake form are excellent for school use as they stain neither the hands nor the utensils.

Take a small square of white cotton cloth (cheese cloth, unbleached muslin or the cheaper cotton crepe goods are satisfactory), or if you are fortunate enough to have it, a small square of thin white silk (china silk or pongee) works well. Cotton handkerchiefs already hemmed that can be bought at the store are good for this experiment, or the raw edges of the small squares of silk may be "rolled and whipped" with colored thread or blanket (buttonhole) stitched.

You will need some white string. The ordinary white string that the grocer uses to tie up bread is about the right weight. The string is to be wrapped and tied round the folds of the cloth so that it will keep the dye from that part of the cloth. Cut a piece of paper the size of the handkerchief and plan in pencil where you will have the "circles" that are to be made by the string. Fancy handkerchiefs can be made in this way even by kindergarten children.

See color job sheet 9 page 80 for further explanation of the process of tie-dyeing.

4. TO MAKE MARBLED PAPER:

Float drops of oil paint mixed with turpentine on top of a shallow pan of water. Use red and blue-green paint. Do not mix them together, but with a brush streak drops of red and drops of blue-green onto the surface of the water. Some of these drops which come together will mix. Insert a piece of paper (manila, white or light gray, of almost any texture and weight, although a rough surface is often more pleasing) just under the layer of paint drops. Lift them onto the paper. Tip it gently from side to side so that the drops can run together and mix making the marbled, mottled effect which is so attractive. Let the paper dry before it is used so that the paint will not rub off. It will be found that where the opposite colors have mixed, there are many gradations of dull reds and blue-greens. Try the experiment with each of the other opposite colors and note the effects.

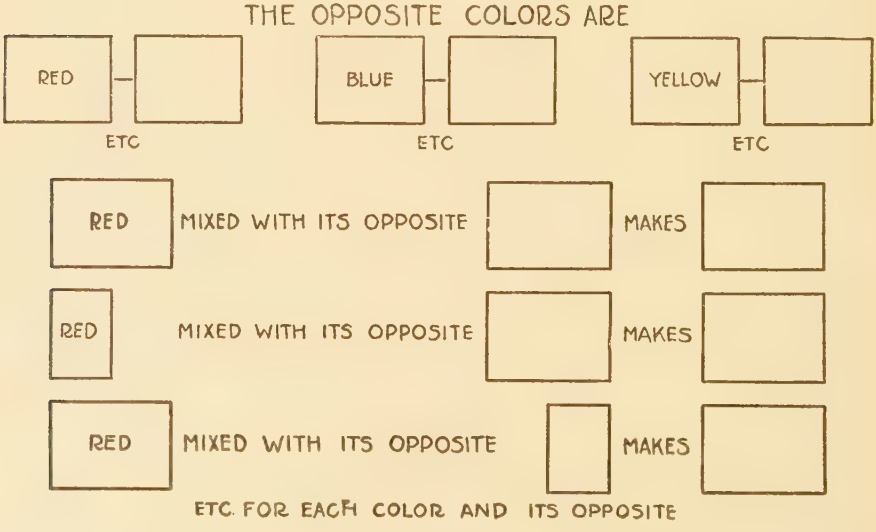
TESTS

Tests: Develop your own tests and questions similar to those suggested under other headings.

Here is one very graphic test which works well in reviewing this experiment in an upper grade:

COLOR MIXING TEST—INTENSITIES

Fill in the blanks with paint. Add the missing blanks until you have a complete chart.



Painted Posters by Pupils of Grades V and VI—Miss Graeff's class

Art Paper Posters by Pupils of Grade III—Mrs. Jones' class

These posters were made by Pupils of the McKinley School to help in a "Save the Wild Flower" campaign. The information in Experiment V, Chapter 6, helped in choosing colors which could be easily seen.

Chapter Six

COLOR EXPERIMENT V

COLOR VISIBILITY OR CARRYING COLORS AND VALUES

(The quantity and quality of light in a color makes it show up.)

HOW TO FOLLOW IT

This experiment also helps you to see which colors and values show up best against different backgrounds. There are two problems under this experiment: Problem I shows you how the *quantity of light* in certain colors make them advance or carry while the lack of light in certain others makes them recede.

Problem II shows you how the *quality of light* in certain colors (the strength of color) makes them show up well nearby.

1. Read Part I first in the problem which interests you. Carry out the directions.
2. Then read Part II, and compare your own findings with this explanation.
3. Later read Part III and work out some of the review problems and tests.

PROBLEM I

TO NOTE THE QUANTITY OF LIGHT IN COLORS. EXPERIMENT TO FIND OUT WHICH COLORS AND VALUES CARRY BEST AGAINST DIFFERENT BACKGROUNDS

Part I—Directions for the Experiment

Select Materials: Three backgrounds—one black or very dark, one white or very light and one gray or in-between. Small piece of white and gray paper. Three small pieces of each of the standard colors, at least 2 values of each color, a tint, a standard color and a shade. Pins and thumbtacks.

Follow These Directions Carefully: Fasten up the three backgrounds where everyone can see them. Place a piece of white paper against the black background. Half shut your eyes and notice how well the white shows up against the black. Try a piece of white against the neutral gray. Does the white show better against the black or against the neutral gray? Why? Try a piece of neutral gray against the black background and against the white. How well does it carry? What is your conclusion?

Against the same three backgrounds fasten one of the Standard Colors. Again half close your eyes. Set up the whole row of colors against the black background of the blackboard.

Which color shows up best?

Which color in the spectrum is the lightest and most like white?

Which color fades most into the black background?

Which of the colors in this spectrum has the least light in it and seems most like black?

Which are the "in-between" colors that look neither very light nor very dark?

Next study each of the colors against the white background and against the gray background. Ask yourself similar questions.

In each case some colors will seem to stand out, some will seem to fade away, and some will be in-between. Which are they?

Against the three backgrounds try the tints and shades to see where each one carries best. Try them against each other.

Does the tint carry best against the standard color or against the shade?

Why?

What makes a color or a value carry?

What makes it recede?

URBAN-PARK ... CHURCH

Answer these questions:

What color appears in distance out of doors?

Where does light come from?

What color does the sun appear?

What is the color of shadows?

Why is this data useful in making posters?

What is an excellent color for lettering on a poster with a black background?

Why are red letters hard to see on a gray background?

Are bright green letters more forceful against a gray or a white background?

Why do tints of colors show up well against shades? And vice versa?

Part II—Giving the Explanation of Problem I

The quantity of light in a color influences its carrying power. Colors containing a large amount of light carry well. Colors containing very little light recede and fade away. White represents *Light.* Black represents *Dark.* A gray which is half way between white and black represents *Middle Value.* White against black or black against white gives complete contrast of light and dark. Contrasts are always forceful.

Yellow is the lightest of the Standard colors, i. e., it has most light in it and is most like white. Purple is the darkest, i. e., it has the least light in it and is most like black. All colors which have a great deal of yellow in them are carrying (easy-to-see) colors. All colors which are closely related to purple are receding (hard-to-see) colors. Yellow against purple represents a complete contrast both of color (See Experiment IV, Opposite-Color data) and of value, which is dark and light.

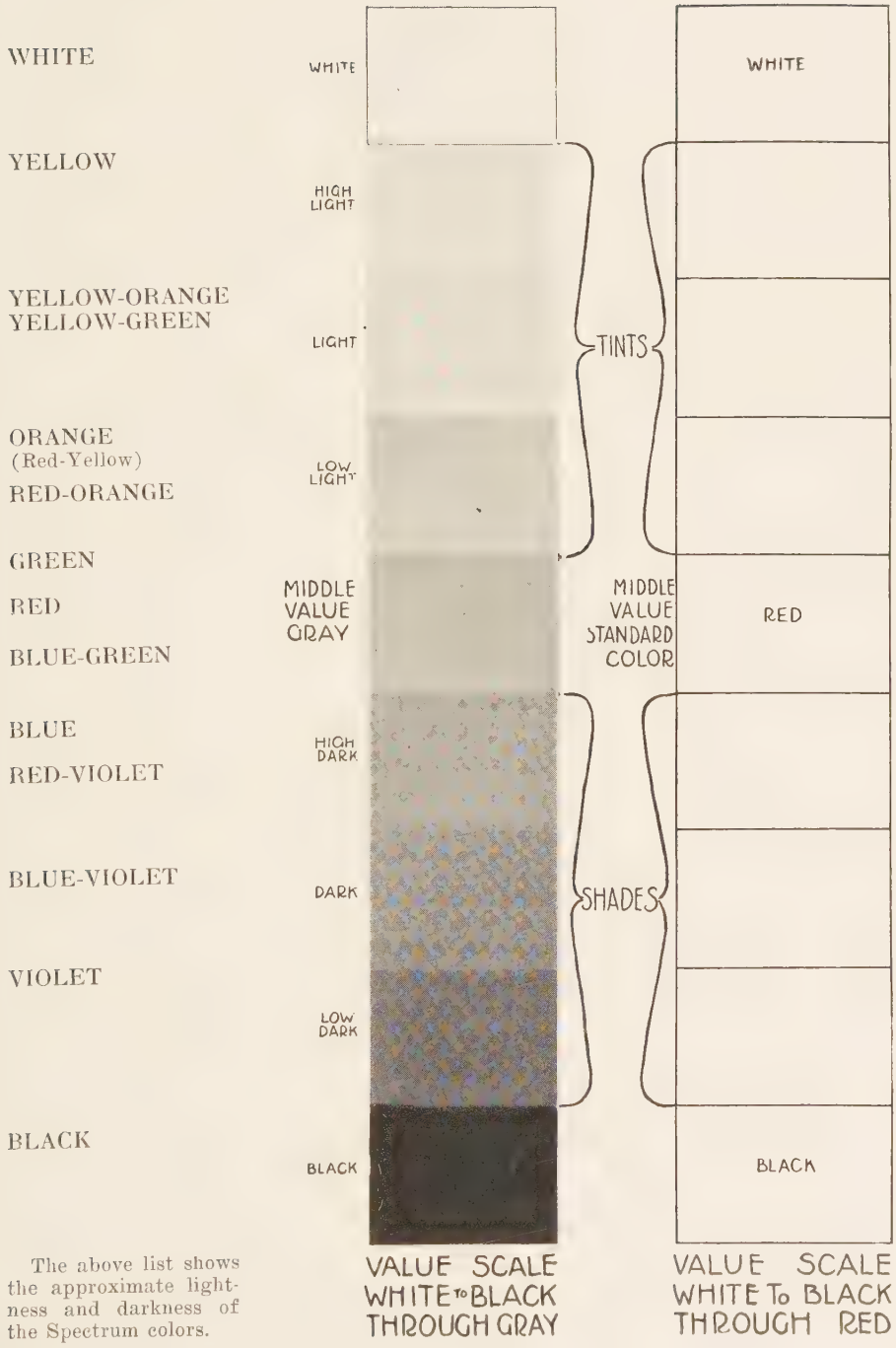
Colors have certain meanings. They are *symbolic.* Yellow, the lightest of the colors that we see, is the symbol of joy and happiness. It is the color of gold and sunshine. The princesses in the fairy tales always had yellow hair. On the contrary, purple is the symbol of mystery and in many countries it stands for grief and mourning. You have noticed the purple haze over distant mountains. You have read of the "deepening purple shadows" and felt that the elves and fairies were about to slip from their hiding places. It is easy to remember that yellow and purple are opposite. In how many ways have you found them to differ? If you are interested you can easily find a great deal about the symbolism of colors. (See Exp. VI, Part III, Effect of Colors on each other.)

Standard Red and Green are neither very dark nor very light. They are the in-between values like gray. They will not show up as well against gray as against white or black because they are more related to it in value.

Gray and the in-between colors are useful for quiet, restful color combinations because they are related in value and consequently do not "jump" apart. Likewise all light colors are related in value and all dark ones.

Tints and Shades of any one color offer a wide range of strongly carrying effects when used together. For instance a tint of red (pink) used against a shade of red (maroon) is sure to carry strongly because there is so much light (white) in pink and so little light (so much black) in maroon. But any number of light reds in combination will fit together closely because they are very light and likewise any number of dark reds.

White and black and other contrasts in light and dark such a yellow and purple and tints and shades are useful for the exciting, vivid combinations that we need for posters and advertising work. Here is a scale showing the Values of the Standard colors in relation to a Value scale from white to black.



The above list shows the approximate lightness and darkness of the Spectrum colors.

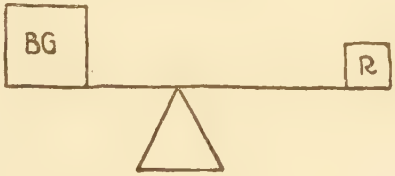
PROBLEM II

EXPERIMENT TO SHOW COLOR STRENGTH OR HOW THE QUALITY OF THE LIGHT IN CERTAIN COLORS MAKES THEM SO BRIGHT THAT THEY SHOW UP WELL NEARBY

Part I—The Experiment

Follow these directions:

Set up a row of bright standard colors against a background of neutral, middle value gray. Notice which color looks the brightest. Walk back away from the row and see if the color looks just as bright. At the back of the room, half close your eyes and notice how this color seems to grow less bright and to lose its color force. Remove this color from the row and see what other color has a great deal of color force. These colors seem to "jump" at you. Remove the jumping colors one by one. Which color has the least color force? Now place red which has the most color force beside yellow which is the most advancing color. Nearby and with eyes half closed how do they compare? Draw yourself a pair of scales and balance the opposite colors on them to show their approximate force.



This diagram means that little bit of red or orange is as forceful as a lot of blue-green or blue. Remember this when you are using red or orange or any strong color.

Part II—The Explanation

Red has the most color force. It is the most intense color. The light rays which bring the sensation of red to our eyes are long and slow and very strong. Red is said to be strong in *chroma,* which is another word for color quality and force. Red is a hot, vivid color. It is found in fire and flaming fall foliage. It is a cheerful color but it is is so bright that it should be used carefully and in small quantities.

You learned in the preceding Problem I that red is neither very light nor very dark in value. For this reason it does not carry at a distance as well as yellow which is very light in value. People often make mistakes in using red for the words in posters. They think only of its brightness and forget that it is neither light enough nor dark enough in value to make it carry strongly against most backgrounds.

All colors which have a great deal of red in them have much color force. Orange is a strong color. Can you tell why it often shows up better than red? What two colors make it? Purple is a weak color. It has little color force. Blue is also weak in color force.

The diagrams which you can make to show the relative strength of opposite colors will not be exact or accurate. They will only help you to remember that red and all hues of red are so strong that they should be used in small quantities if you do not wish them to over-balance the other colors.

Part III—The Conclusion to Both Problems in Experiment V and Extra Problems and Tests for Review

CONCLUSION. The quantity of light in a color makes it show up well at a distance. The light colors show up well in contrast to dark colors and vice versa. Colors which are neither light nor dark never show up very well. They make quiet color combinations and are very useful when properly combined. Contrast plays a large part in making colors show up well. The more contrast, the better the colors show up.

But you can have so much contrast that the result is unpleasant. It is more difficult to make colors harmonize and balance than it is to make them contrast. Remember that only a little contrast is needed to add life to the combination. You can make colors show up by making them contrast in hue (color), dark and light (value) or brightness and dullness (intensity). A contrast in all three makes a most exciting color combination. You will practice in combining colors until you know just how much contrast you need for your purpose.

The strength of a color is due to the quality of the light in it. It makes the color show up well nearby. But color force does not carry far unless it is strengthened by a change in lightness or darkness. Orange shows up very well because it contains some of the color strength of red and the carrying power of yellow.

Test out these conclusions as you choose and use colors in your work.

EXTRA PROBLEMS. These are helpful for reviewing and checking up on the information gleaned from this experiment.

1. *To Picture Balance of Color Force.* Here is one suggestion. You can think of many others: Look at the pair of scales which show the relative strength of two opposite colors. Draw a sketch of a see-saw on which two children are riding. Make the child who wears the blue green dress or suit much larger than the one who wears the red. Do this for each pair of opposites. Use a black or gray background.

The making of posters offers all sorts of opportunity for applying what this experiment has shown.

TESTS

Tests: You may wish to work out your own test questions but here are a few suggestions to help you.

Suggested Type of Completion Test on the Carrying Power of Colors. There are 15 statements. Place the correct word in each blank space.

1. ..... is the color which is most easily seen against a dark background.
2. The color which fades most into a dark background is .....
3. All colors which are very ..... show up well on dark backgrounds.
4. (1)..... (2)..... (3)..... (4)..... are colors which have yellow in them.
5. All of the colors in the ..... family show up (carry) clearly against a dark background.
6. Far distant mountains usually appear ..... in color.
7. ..... is a color used often for the words in outdoor advertising.
8. Colors having ..... in them are often used for backgrounds.
9. .....-green is more easily seen than green.
10. ..... orange is more easily seen than orange.

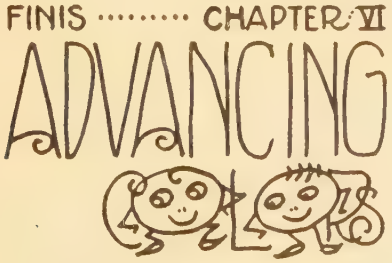
11. ..... shows up well on blue-purple.
12. ..... show up well against shades.
13. ..... represents light.
14. ..... represents dark.
15. ..... are light values of colors; ..... are dark values of colors.

Suggested Type of Selection Test on the Carrying Power of Standard Colors.—There are 5 statements. Underline the word or words which correctly complete the meaning.

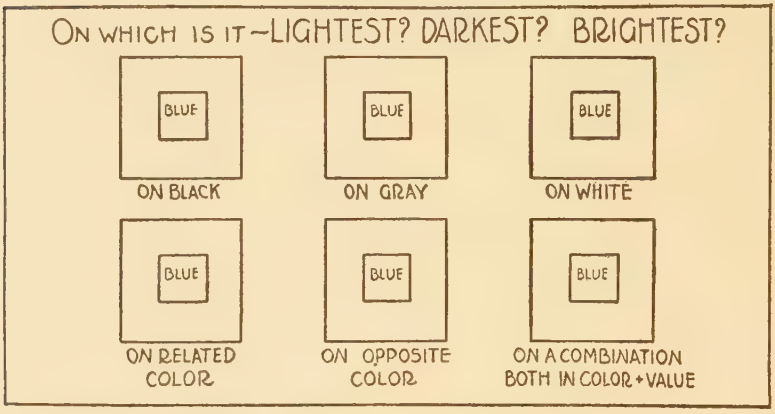
1. The color which is most easily seen against a dark background is: red, blue, yellow, green or purple.
2. The color which fades most into the dark background is: red, purple, blue, yellow, green.
3. This color can be very easily seen against the blackboard: green, yellow-green, red, blue-purple, green-blue, orange.
4. Distance can be shown by the use of yellows, reds, blues, purples.
5. Tints, shades, light values, dark values have a great deal of light in them.

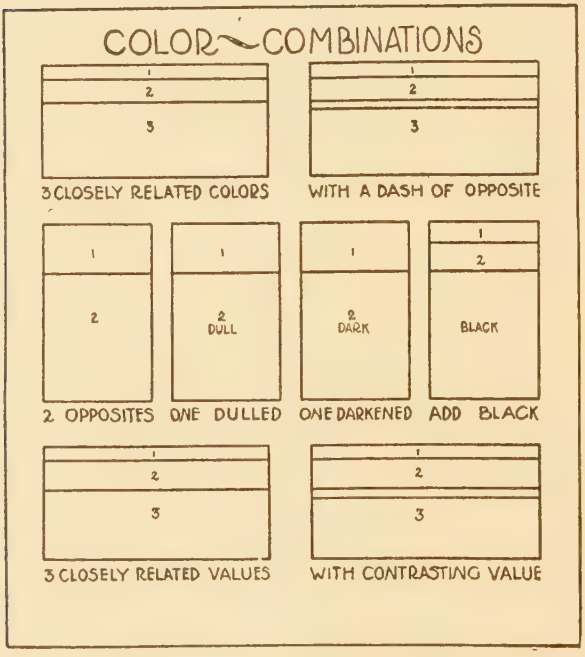
Suggested Type of True-False Test.—There are 10 statements. Place "yes" before each accurate statement.

1. ..... Yellow, of all the standard colors, carries best against dark backgrounds.
2. ..... Purple shows up well against a dark background.
3. ..... Purple is a good color to choose to represent distance.
4. ..... Yellow is a good color to choose for words that are to be seen against a dark background.
5. ..... Red carries as well as yellow at a distance.
6. ..... Red carries better than red-purple at a distance.
7. ..... Yellow-green shows up better than blue-green.
8. ..... Blue-green fades into the distance.
9. ..... Blue-green is a good color to use for words against a blue background.
10. ..... Red is a very strong color and is difficult to use in large amounts.



Here are charts helpful in bringing out the points found in Experiment VI. Make a large chart like each one and use it for study and review.





Chapter Seven

COLOR EXPERIMENT VI

COLOR COMBINATIONS OR THE EFFECT OF COLORS ON EACH OTHER

This shows how colors used together seem to change each other

HOW TO FOLLOW IT

This experiment helps you to understand why a color can be quite changed by its surroundings. Surroundings may make a color look darker or lighter, or brighter or duller or even different in color.

There are two problems under this experiment.

Problem 1 helps you to see how the same color may appear quite different on different backgrounds.

Problem 2 helps you to see how certain combinations of colors blend together or can be made to blend while others always contrast.

1. Read Part I first. Carry out the experiment.
2. Read Part II to see if your findings agree with the explanation.
3. Part III is not given in detail because it is possible to study the effects of colors on each other everywhere in your surroundings. Be observant.

PART I

DIRECTIONS FOR EXPERIMENTING WITH COLOR COMBINATIONS

PROBLEM I—Directions for the experiment to notice how the same color appears against different backgrounds

Select Materials: 4 background papers (1 black, 1 white, 1 closely related and 1 opposite color); 4 squares of any standard color; 4 squares of neutral gray. *Follow these directions.* Fasten up the four backgrounds. Pin a square of the standard color against each background. Half closing your eyes may help you see the differences more easily, because half closing the eyes gives much the same effect as distance.

On which background does the color look darkest?
On which lightest?
On which does it look most like the background?
On which does it appear brightest?
What other differences do you notice?

Next pin a square of light neutral gray against the same backgrounds. Study how the gray changes color on the colored backgrounds.

On which does it appear lightest?
Darkest?
On which does it change color?

From this you can begin to see how much the surroundings of a color affect it.

Try this same experiment with each of the Standard colors. Which color is most affected by its surroundings? List your findings so that you can refer to them when you are combining colors.

PROBLEM II.—To notice how certain combinations of color appear.

Select Materials: 3 closely related colors; 2 opposite colors, a dull color; a tint or a shade of black, white or gray; 3 closely related values of one color, a contrasting value, one of these opposite colors.

Follow these directions: (1) Place the 3 closely related colors together (See Exp. II—Related Colors.) Notice how they blend into each other. Add a tiny streak of an unrelated color. No-

tice how this color stands out, comes toward you, and seems to add life to the combination. (2) Place two or three closely related values of one color together. Notice how they blend. Add a dash of contrast, either a very light tint, or very dark shade and note how this contrast stands out and emphasizes the others.

(3) Place two opposite colors side by side. Note how noisy, crude, hard and vibrant they are. They are difficult to combine successfully. (a) Substitute a dull color for one or both of the bright ones. Notice how this helps to neutralize and harmonize them.

(b) Use a great deal of black, white, or gray with the opposite colors.

(c) Lighten or darken one or both of the opposites. Note how they begin to blend.

PART II

EXPLANATION OF THE EXPERIMENT WITH COLOR COMBINATIONS

Do not read this explanation until all of the experiment is done. It is more fun to discover the color effects for yourself than to have someone tell them to you.

Colors used together always affect each other. They do not have to be mixed together with a brush to influence each other. All of the contrast between the value and hue of colors is emphasized when they are combined.

Opposite colors and values emphasize each other's differences and seem to become more unlike. Closely related colors and values reflect on each other and blend together.

The law of contrast always works when you combine two colors. *Contrast of dark and light* makes light colors look lighter on dark colors than on light or middle value colors.

Contrast of color (hue) makes a color look brighter on an opposite color than on related colors.

Contrast of intensity makes bright colors look brighter against dull colors. Experiment for yourself until you notice this.

It is contrast of value which makes yellow look lighter on blue purple than on orange or on black than on white. It is contrast of color (hue) which makes yellow look brighter yellow on blue-purple than on orange. It is contrast of intensity which makes yellow look very bright against dull yellow or gray.

Contrast adds life and "pep" to a color combination but it can easily be overdone. You must learn to control the amount of contrast so that you have just enough and not too much. Too much contrast defeats its own purpose for contrasts vibrate, separate, and are noisy. Too much noise is hard to live near.

The light neutral gray on black appears very much lighter than on white because of the value contrast. The light neutral gray on bright red appears slightly green and on the bright green appears slightly pink because of the color contrast.

Do your own findings agree with these statements? These facts are very useful when you are combining colors. The choice of the surroundings of a color is as important as the color itself. The "camouflage" painting used during the last war depended on this data for its success. Can you see how the appearance of a ship could be changed by painting different hues and values on its surface? Or how you could make a ship fade into the background of the sea by painting it with colors of certain values? Try making a piece of paper vanish into the wall color; or try making a round baseball or a square wooden box fade into a background or look like some other shape.

Colors not only affect each other, they affect people. Each color that

you see affects you somehow. You like some colors. You dislike others. Some colors make you happy, some make you sad. There are colors which make you feel warm and others which make you feel cool.

Literature is full of allusions to the symbolism of color. Light colors or tints suggest youth, spring, fragility, and gaiety. Dark colors are more dignified, serious, and powerful. Very bright colors are loud, forceful, and elemental and are apt to appear blatant and over noisy. Neutral or dull colors are more subtle, refined, and charming in effect. In general, each of the hues has its own particular meaning.

Because of its effect on many people, black has long been used as a symbol of might, death, mourning, sin and despair. White has come to signify perfection, purity, innocence, and the spiritual phases of life; while red suggest fire, heat, passion, patriotism, danger of war, and anarchy. Green suggests coolness, poise, hope. Blue suggests truth, justice, restraint and honor, although often doubt and discouragement. Purple symbolizes royalty, dignity, mystery, sadness, mourning and regret. Yellow represents sunlight, cheerfulness, wealth, wisdom, strength and power. There are many other interpretations of emotional reactions to color but these are sufficient to show the idea.

Of late, we have come to think a great deal of the restful and quieting effects of certain colors and the exciting and stimulating effects of certain others. We are slowly developing a psychology of color. We have thought of the effect of colors especially when we have come to choose the colors of our clothing or of the furnishings of the rooms in which we live. We no longer feel a charm in red for wall coverings. Our taste tends toward those more restful dull colors that make better backgrounds for us and our furniture. We are learning that certain colors are restful for nervous and sick people and that a very light yellow is a better color than glaring white for the pages of books which are to be read by those with defective or weakened eyesight.

Try this little experiment if you are interested in finding out about your own color preferences and choices. Take many small pieces of as many colors as possible. Choose all sorts of colors, bright colors, dull colors, light colors and dark colors. Mix them all up. Have each child go to the pile and choose the three colors which he likes best together. Have him pin his choice together and label it out of sight on the back with his name and grade.

Count to see how many of the choices are exactly alike.

Count to see how many start with the same color.

What points of likeness do you notice in the choices?

What points of difference?

If you are in upper elementary grade it will be interesting to try this experiment on a primary grade and to compare their choices with yours. All of this color science is quite new and we have yet hardly realized any of the many possibilities.

PART III—REVIEW OF EXPERIMENTS TO NOTE COLOR EFFECTS

Problems and Tests. There are no review problems nor tests listed for this experiment. They are not specially needed because all you have to do is to look anywhere around you at people's color combinations in clothing, house furnishings, books, advertising, window decorations, etc., and you will have ample opportunity to analyze and study the effects of colors on each other.

Chapter Eight

COLOR EXPERIMENT VII

COLOR AMOUNTS—THE APPLICATION OF A PRINCIPLE OF DESIGN IN COLOR CHOICE AND USE

This experiment will help you to use colors is satisfactory amounts. It is very important because almost any colors can be made to harmmonize if used in proper amounts. The information which this experiment offers you can never be very detailed because the choice of amounts of color is really your own special problem and must be decided differently for each case. Your choice shows your taste. It is a record of your own judgment.

1. Read Part I first. It contains two problems. Problem 1 shows you how to harmonize unlike colors.
2. Problem 2 shows you how to add contrast to closely related colors.
3. After you have finished Part I, read Part II the explanation and develop Part III, the review.

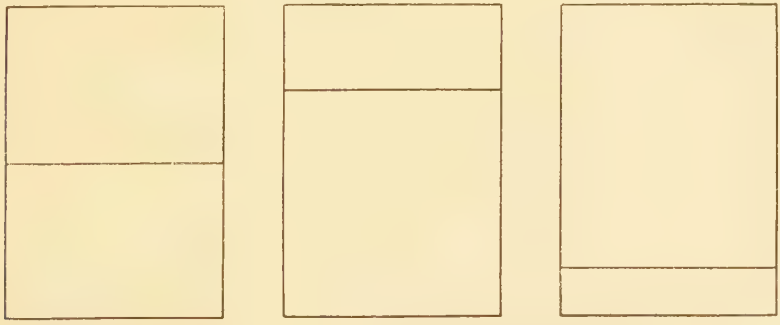
PART I

THE EXPERIMENT WITH COLOR AMOUNTS

There are two problems under this one experiment. Finish each one before you read Part II.

The choice of amounts of color has to do with design and proportion. It is really a problem in space division. Do you remember what you have found out about dividing a rectangle?

The result lacks variety if you divide the rectangle in the exact center for then every one's space division is exactly the same. It is better to divide the space above or below the center because you then have a chance for choice and variety in the space division. The same principle holds true for colors. Equal amounts of each color are monotonous. It is more pleasing to use a great deal of one color and only a little of the others. This is especially true in combining bright colors or colors having much contrast in dark and light.



EVEN SPACE DIVISION
NO VARIETY CHOICE OR INTEREST

UNEVEN SPACE DIVISION
OPPORTUNITY FOR VARIATION, CHOICE AND INTEREST

Problem I—To Harmonize Unlike Colors or Values

Study the problem choosing satisfactory amounts for each of the six types of color combinations given below. Decide what effect each combination gives.

(1) Arrange a pair of opposite colors so that there are equal amounts of each. Arrange the same pair so that there is a large amount of one and only a small amount of

the other. The uneven arrangement is more pleasing. Why?

(2) Place this uneven arrangement against a large background of black, white or neutral gray. Notice how much more quiet it looks than all by itself. This shows you that a large amount of neutral color such as black, white, or gray will help to harmonize very bright colors.

(3) Substitute a dull intensity of the same color for the opposite color which you used in large amount. Notice how much more readily the colors fit together. This shows you that two opposite colors blend well when one of them is grayed. Note the effect of substituting a dull intensity for the bright opposite. There are many fine possibilities for useful color combinations among the wide range of dull colors.

(4) Substitute a dark or light value of the color for the opposite which you are using in large amount. This shows you that a variation in dark and light helps to harmonize two unlike colors.

(5) Arrange two contrasting values so that there is a variation in the amount of each. Note the force of the contrast of dark and light. Study how this combination is applied in posters and printing. Add an in-between value. Notice how it relates the two contrasting values and ties them together.

Problem II—To Add Contrast to Closely Related Colors

(1) Arrange three or more related colors using different amounts of each. Half shut your eyes and notice how they blend together. Add a very little of an opposite or unlike color. What affect does it have? This shows you that a little bit of contrast adds dash and life to a closely related and quiet group of colors. Add a lot of the opposite color and notice how the effect changes and is lost. There is too much contrast. Too much contrast starts a riot and makes so much noise that no one wants to have it around. Closely related colors are restful and easy to look at because they blend so perfectly. Use them often and learn to add just enough contrast to "pep" up the group.

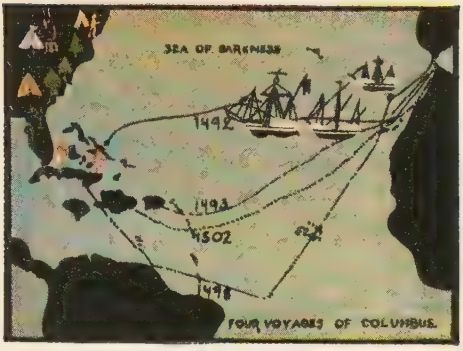
(2) Arrange closely related dark, light or middle values of one color in varying amounts. Note how they blend into each other. Add a contrasting bit of very dark or very light. Note how well it carries, how emphatic it is. Tints and shades offer excellent combinations but we are apt to forget about them because we become so interested in bright colors. A group of values of one color is often called a monochromatic color scheme. Can you figure out what the name means?

PART II

THE EXPLANATION OF THE COLOR AMOUNT EXPERIMENT

Everyone likes variety in the things round about. There is no chance for variety or individual preference and choice in an equal space division or in two colors used in equal amounts. Consequently, we are not as satisfied with looking at them as at combinations which show variations of amount. This experiment has shown you how to vary amounts and thus help to harmonize noisy and unrelated colors and contrasting values and to add contrast to closely related colors and values.

Explanation of Problem 1. Under Problem 1 there are listed four chief ways of harmonizing unlike or unrelated colors of full brightness or intensity. Harmonies of unlike



Painted Map of Columbus' Voyages. Grade V—History.

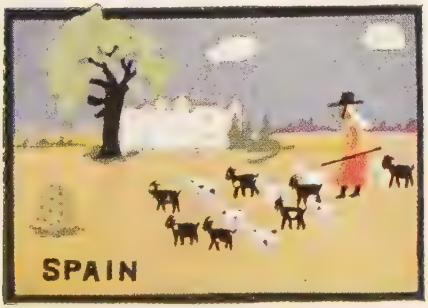
To make Illustrations, Cartoons, and Posters that are forceful, you need the information from all seven of the Color Experiments. Notice how your work improves as you get more and more data from the experiments.

Grade IV—Geography
Tulip Fields in Holland

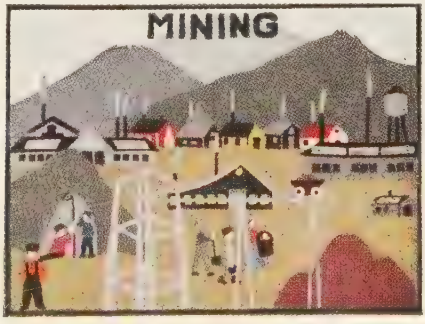
Grade VII
History

Grade I—The City
Safety First A. B. C.

Crayon Drawings.—Free illustrations on subjects related to Geography, History, Safety, Health, etc. See job sheet 2, Chapter 9. It tells you how to make crayon drawings.



Geography Poster—"A Spanish Shepherd"
Grade V



Geography—Industry—"A Mining Camp"
Grade VI

colors often used to be called complementary harmonies or harmonies of contrast.

(1) This grouping of color amounts shows you the effect of using a great deal of one color and only a little bit of the other. This way is not so subtle as the three following.

(2) This grouping shows you the effect of using a great deal of a neutral such as black, white, or gray and only a little of the unlike colors. This is why we often hear it said that black (white or gray) will go with any colors. This way offers excellent combinations for posters and for all sorts of brilliant and striking color effects.

(3) This grouping shows you the effect of using a large amount of dull color with a small amount of bright. This way offers a large range of color choice for there are millions of dull variations of each color. It is very useful in clothing, home furnishing and everywhere that restful, quiet combinations are desired.

(4) This grouping shows you the effect of using a large amount of the light or dark of the color with only a small amount of the bright unlike color. This is also an effective sort of color for use on posters and for striking effects if the values are kept far apart and in strong contrast.

(5) This section shows you how effective two contrasting values are. It also shows you how to add one or more in-between values and thereby lessen the contrast. Contrasting values are useful for posters, printing and all advertising problems which require a great deal of force and contrast.

Explanation of Problem 2. Under Problem 2, there are given experiments to show how to add contrast to closely related colors and values.

(1) You add life, snap and "pep" to closely related color combinations by using large amounts of the closely related color and only a very little dash of a contrasting color. Combinations of closely related neighboring colors are sometimes called analogous color schemes.

(2) This same principle of variation holds true in combining values of colors. If all the values are closely related, i. e., very light, very dark or middle value they blend so well together that you may wish to add a little bit of contrast to give life to the whole effect. You can choose far apart values and achieve fine strong contrasts of dark and light or you can choose nearly related values and achieve very subtle and quiet effects but you must always make satisfactory choices of amounts in order to have variety in the combination.

These combinations using several values of one color are often called monochromatic color schemes. Mono means one, choma means color. You can easily see why these color combinations are called monochromatic.

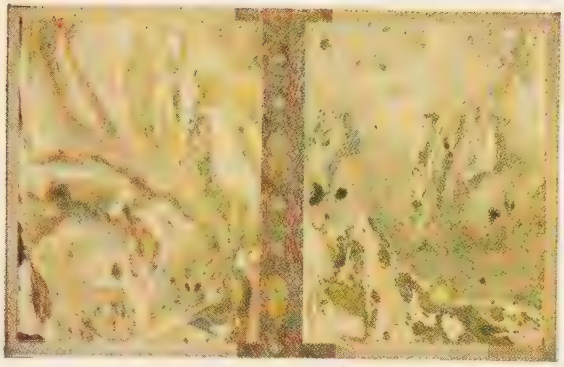
PART III

THE REVIEW TO THE EXPERIMENT ON COLOR AMOUNTS

Problems. Study how to vary the amounts of color in every color choice which you make. Look over other people's choices and see how the amount of color affects the result. Analyze the color amounts which you see in home furnishings, clothing, posters, store window displays, etc. Are they as satisfactory as possible? How would you change and improve them? With this data in mind try arranging flowers in suitable vases for the school room. Notice how much more effective the bouquets are when the colors are chosen and arranged thoughtfully.

Look in the florist's window and see what colors of flowers are combined and how much contrast is used in each combination. Study textiles in the same way, oriental rugs, pottery, peasant embroideries, hats, jewelry, etc.

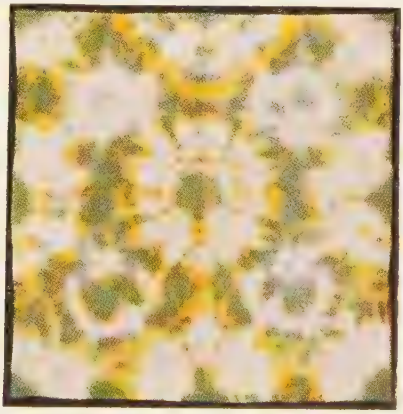
Tests. There is little need for suggestions as to tests. Every color combination which you see offers material for your analysis and judgment. Study out the whys of the color groupings round about you and watch your own color taste grow.



Inside of portfolio made by Grade VIII, Pickett School—Miss McConnell's Class. Lining Papers are of "oil and water" paper. Note effect of using closely related colors. Outside of portfolio made by Grade VI, Whittier School. Note how opposite colors are used with much black.

A group of special problems showing use of color. Boxes covered with crayon decorated, block printed, patchwork, and marble papers; calendars, greeting cards and tree ornaments in cut paper and paint; memo pads and phone lists in gay colors.

Cloth Toys and Bean Bag designed, cut, sewed and decorated with crayon by Grade I and III, Nathan Hale and McKinley Schools. Woven Holder by Grade II, Birmingham School.



Cloth tied and dyed in 2 colors by a member of the Art Club, Washington School. Teacher: Miss Burchfield.

Chapter Nine

MATERIALS FOR PRODUCING COLOR. JOB SHEETS ON PROBLEMS INVOLVING THE USE OF COLOR.

We must never let the technique of using materials for producing color become more important than the color facts involved. And yet, we must learn how to use color tools in a satisfactory way. In general, we seem to have found that any material which helps us to use more and better color is the material to use.

We have not found it advisable to make any set grading of materials except for reasons of economy. When one is emphasizing color and not the material for producing it, there is little need for a set grading of materials. Fortunately or unfortunately, all fifth graders have not fifth grade skill in handling materials. Some of them may be more skilled than most adults. Others will be less skilled than a clever child in the third grade. You will find this wide variation among children at any level. It is the chief reason why the grading of materials seems impractical and hampering.

Crayons are as useful to grown-ups as to kindergartners. Poster paints are as useful in Grade I as in the High School. Colored papers, enamel paint, oil paints, colored cloth, dyes, colored clays and cements, transparent and opaque water colors, crayons, chalks, pastels, ink, etc., are materials useful to any group which has chosen to work out a problem to which these materials are suited. There is often as much variation in the technical skill of children within a grade as there is between grades.

Study color and use the medium or material, which best fits the problem. You will find that you are soon using more color and more materials for producing color.

COLOR JOB SHEETS

The following pages contain some explanations which elementary school children have made concerning color mediums, processes and problems which they like to use. There are many other problems and many other useful materials which are not mentioned, yet these few explanations may suggest to you new ideas for using old materials or materials which you have not yet tried.

The explanations are in the form of job sheets. Each one was written either by one child or by a group of children who wanted to tell another group what they had learned concerning a certain process, or the technic of using a certain material. Each job sheet has been used over and over again by groups of children. There are many more of these job sheets which limited space has forced us to eliminate from this book. Perhaps you will like the idea enough to use it in your own room and thereby develop some job sheets of your own.

JOB SHEET 1—HOW TO WORK OUT A ROOM PLAN IN CRAYONS

Explained by ROSE MARY RICE, Age 13, Grade 7, Lagrange School

Materials—Manila drawing paper, crayons.

Directions—First, we must decide on what room we are going to draw in our plan. I like best to plan a living-room because I like the color of things that we can choose for a living-room.

We make our drawings in elevation. This means that we never use perspective in our drawings. It is easier and quicker to draw in elevation without perspective because we only show one side. This takes less time than if we tried to show the front, top and side as in perspective.

We decide where we will place the doors, windows, baseboard and other fixtures. We place the door and windows so that they balance with each other. We make them fit the size and shape of our paper.

Next we decide on suitable wall, floor, and wood-work pattern and color.

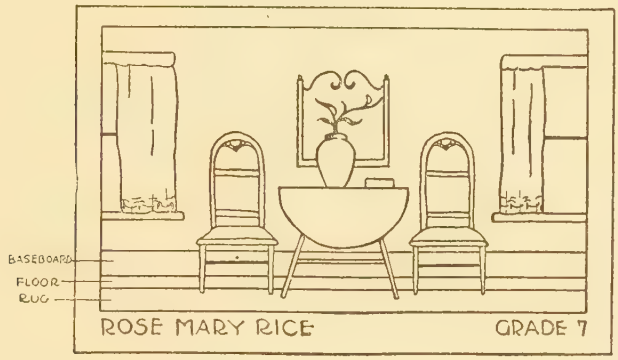
We never use many pieces of furniture. We group them with the window or door, so that they all fit together and look convenient and comfortable. We choose furniture suited to the use of the room. We would not put a davenport in the dining room, but of course, you already know that. Don't you think it is a good plan to choose a few useful pieces of furniture and to leave out most of the bric-a-brac? If we show a mantle or a table in the room, we put only a few articles on it and try to make them balance with each other.

We are careful to choose appropriate colors for our room. In a cold room, we use bright warm colors like yellow and orange to make the room look warmer. In a warm room, we use cold blues and greens to make the room look cooler. We use dull or neutral colors in large amounts. We use a bright color for accents in the room. We use bright vases, books, pillows and pictures. (See Experiment 6—Color Combinations and Experiment 7—Color Amounts, for further data to help in choosing colors.) Sometimes, when we wish more color in the room we use a group of closely related colors with small spots of an opposite color. (See Experiment 2—Related Color and Experiment 3—Color Contrasts.)

We think a few good pictures are enough for a room. One fine, large picture is better than several small ones, but several small pictures of similar shape may be grouped together, if you are careful. We like to hang our pictures, so that the wires do not show. If the wires have to show, we hang our pictures from two hooks with two parallel wires. We never hang them to one nail, because the wires form a triangle which does not fit the lines of the wall. Pictures should fit the wall spaces in which they hang. They should form groups with the furniture. They should be related in color or at least of colors that do not fight with each other.

We draw our room plans with crayons, because crayons are quick and easy to use. We draw with little short strokes, making each line show up clearly.

This is my plan for the side wall of a living room. Some of the other children worked out plans for dining rooms, kitchens, bedrooms, bathrooms, hallways and sun-rooms. Some other day we are going to make a plan for the outside of the house, showing the placing of the porch, windows, doorway, chimneys and shrubbery.



Questions—

(1) How do you apply the principle of balance in planning the side elevation of a room.

(2) Why do we never use perspective?

(3) Why should we use bright colors sparingly?

(4) What colors do we use in a cold room? In a sunny room?

(5) How should we draw with crayon?

JOB SHEET 2—HOW TO MAKE CRAYON PICTURES ON ANY SUBJECT

Explained by Roberta Lloyd, Grade 5, Legrange School

Materials—Crayons and drawing paper.

We draw with crayons whenever we have any free time. We like the clear bright colors. We make drawings of everything which we study. We draw to help us to remember—*Health facts, safety rules, courtesy, and good manners, thrift and bank day, bank week, better English, stories which we read, geography, history, etc.* We draw to show how we travel and dress, and how our homes look. Our drawings always tell a story, only we use pictures in place of words. Pictures are easy to remember. We like to look at them, if they look real or if they are funny.

Now, I will tell you how I use my crayons. I hold the crayon flat on its side between my thumb and first finger, because then it makes wide swinging strokes. I never press hard with it, because then it makes stiff marks. Sometimes I hold it up like a pencil to make straight narrow lines.

I can make many colors with my crayons by putting one color on top of another. I make dull colors by adding a thin layer of the opposite color. I make dark colors by adding a thin layer of black. I make light colors by pressing lightly. I change the hue by adding a thin layer of another color. (See Color Experiment 4—Color Mixing, for detailed data.) I never use a pencil with my crayons, because pencil lines are so hard and gray that they do not go with the bright crayon marks. I draw on the rough side of the paper. I always let a lot of paper show though. I never rub back and forth in the same spot long enough to make the crayon marks glisten.

JOB SHEET 3—HOW TO MAKE CARTOONS

Described by G. BITTER and M. SCHMITZ, Grade 5, East Side Central, MISS GIBSON'S Class

Read Directions Carefully

Materials: A sheet of gray or cream manila paper, 9x12-inch, pencil or lettering pen and ink; crayons or watercolors; ruler.

Directions: To make a cartoon, you must have a story in mind. The story may be true or one that you have read or made up. You must decide on the kind of pictures which you will use to tell the story. It is very important to have a clear idea of what you want to draw. Hunt up any extra information that you need. You will find excellent cartoons in the daily papers and magazines. Make a collection of cartoons and judge which of them are most forceful. Start a scrap book of cartoons. You cannot draw an automobile unless you know just how an automobile looks. Either make sketches from a real automobile or from a photograph or picture of one.

Next you must decide on the number of pictures you will need to tell the story. Then arrange the background by dividing it into as many spaces as you are to have pictures, leaving a margin all the way around the paper. A good margin is one which is widest at the lower edge of the paper. If the side margins are equal then the paper looks balanced.

Sketch in the pictures lightly with a hard pencil. Be sure and draw large so that each object can be easily seen. Fill the whole space. Use crayons or paints to color up your ideas. Choose colors which show up well against the background. A few words that will help to explain the drawings may be lettered above each picture. We have fun making cartoons. We make them on all subjects. We use them to help us to remember or to put over facts and ideas to other groups.

Grade 4 GEOGRAPHY
TULIP FIELDS IN HOLLAND

Grade 7 HISTORY

Grade 1 THE CITY
SAFETY FIRST, A. B. C.

JOB SHEET 4—HOW TO MAKE CUT LETTER SLOGANS FOR POSTERS

Explained by A. Whitmore, Grade 6, Navarre School, Miss Zimmerman's Class

Materials: A sheet of dark colored background paper, poster paper in light, bright colors, scissors, pencil, eraser, ruler and paste. The background paper should be as heavy as construction paper for thin paper usually wrinkles when paste is used on it.

Cautions: Be sure to choose two colors that look well together. The one for the letters must show up well against the other which is for the background. See Experiment V—Carrying colors for data on colors which show up well. Plan how the words will be placed. Make small sketches. Choose the most interesting. Draw light guide lines with a hard pencil and a well sharpened point. Cut thick letters. Leave a margin around the paper, the widest margin is usually placed at bottom of page.

Directions: 1. Decide which paper shall be the background and choose the amount of clean margin which you will leave. This margin is very important. It helps the words to show up.

2. Pick out the most important words in the slogan.

3. Make these words the largest, i. e., the tallest and if possible the thickest. Sometimes they may even be of another color.

4. Make all other words smaller than the important words.

5. Draw guide lines on background paper so that the letters will all "block" and form an even line when pasted. You may find it helpful to cut out a block of paper to represent the whole size of the slogan. Then fold this block into the required number of lines and cut them apart to form strips. Next fold each strip into the number of letters found in the word which will go on that line. Now you have many little blocks representing the exact sizes of each letter which you will cut. This way of working helps a great deal if several children are trying to work on the same slogan.

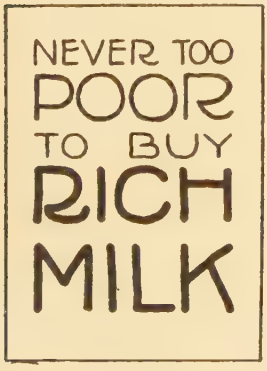
6. Cut *thick letters* for each line of words.

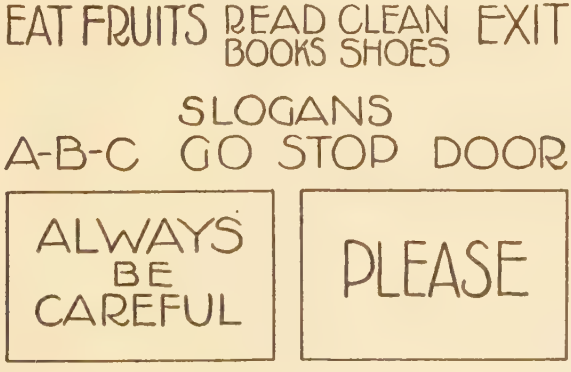
7. Place letters on guide lines to form the block.

8. Paste letters to the background. Use only a thin coating of paste on the back of each letter, then spread it evenly over the whole surface of the letter.

9. Press after pasting. Pressing under some sort of weight helps the "looks" of the poster greatly.

Note: The important word or words may be cut from a different but closely related color. This adds interest. The slogans may be worked out in poster paint. If you do this, draw around the cut letters and fill in with paint.





JOB SHEET 5—HOW TO PAINT FLOWERS, FRUIT AND VEGETABLES WITH WATER COLORS

Explained by C. WIDMAUR, Grade 7, Washington School; MISS BURCHFIELD, Teacher

Materials: Clean water colors; clean paint brush; clean paint cloth; a dish of clean water; fresh flowers or fruit to look at; a sheet of manila drawing paper of the size desired.

Cautions: DO NOT scrub. DO NOT touch the painting the second time for if you do, it will be muddy and the charm of clear color will be lost. DO NOT draw an outline first. Paint directly with a full, wet brush.

Directions: Flowers should be arranged singly or nearly so. Fruit and vegetables are best when used with their own fresh leaves. Always paint from real objects; at least for the first time. Afterwards you may be able to draw the fruit or vegetable from memory but the first time you will not know enough about it. Observe carefully.

Before starting to paint, make a careful study of the thing which is going to be painted. Study it for color and growth. Be sure to notice the highlights. Remember to leave those spots very light. Usually it is best to paint the flowers and fruit first, then the foliage. Do not make a specialty of painting the stems. Let them remain slim and in their place. Paint them last and have a keen eye for the way in which they grow.

I like to paint on long narrow strips of manila paper. I make whatever I am painting fill the whole space from top to bottom and sideways.

Hold the brush handle in the middle and keep the arm free from the desk while painting. A much better brush stroke can be secured when the arm has full, free movement. The pointed tip of the brush will make a fine line, but if a broad line is desired press down on the brush.

Do not mix any color washes in the pans for best results in this work. For instance, to make the greens for leaves, first fill the brush with water, take up some yellow and then take up some blue in the same brush. Blend them on the paper as you paint the leaf shape. Experiment IV—Problem 1—How to mix hues will tell you more about this point. The result should be a pleasing green of several hues. Take yellow first so as to keep that cake clean. Mix your other colors in the same way, always dipping the brush into the lightest color first so as to keep the colors in the boxes clean as possible.

To clean out the undesired color from the brush use the paint cloth and clean water. To obtain bright colors the water in the pan must be changed often and kept clean.

I never write my name in pencil on the front. Sometimes I put my initial somewhere in a vacant space. I make the letter with the brush and use one of the same colors of paint which I used in the vegetable or flower. One of my paintings is in the group on page 25.

When the sketch is finished the cakes of paint should be cleaned, the paint brush washed and brought to a fine point so as to dry in proper shape and be ready for the next painting period.

Questions:

Are the colors to be mixed in the pan for this work?

How are the colors to be kept clean?

How many times may any part be painted?

How must the water in the pan be kept?

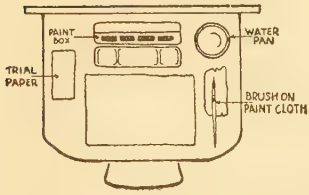
Why must you have a clean paint cloth?

JOB SHEET 6—HOW TO USE WATER COLOR PAINT

Explained by Ruth Theal, Grade 6

Washington School—Miss Burchfield, Teacher

MY DESK

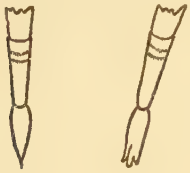


I try to sit straight in front of my desk and to keep both feet on the floor.

Materials: Water color paints in box with lid for mixing. Water pan, brush, paint cloth, paper.

I like the times when we use paints better than any other times in school. Here is a diagram showing how I plan my desk. I work faster when my materials are in order. Perhaps you can figure out a better way for your own desk. Any order which saves motions is a good one. Here are some helps to make the water colors work well. It took me quite a long while to figure some of them out. I made many mistakes before I learned how.

1. Like this. Never like this.

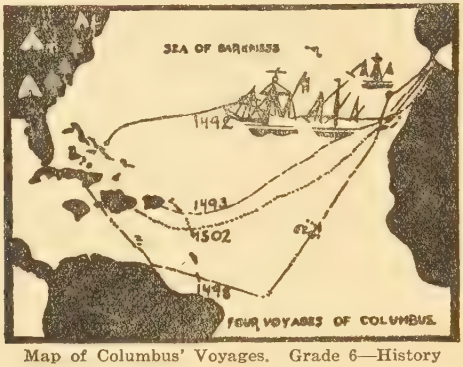


2. Like this. Never like this.

3. Like this.

Never like this.

1. Have a "nice" point on your brush; never let it get "hairy" at the end. Use the paint cloth to point the brush.
2. Hold your brush straight up; never let it tip far sideways or you will make a wide ragged line.
3. Make long even strokes with the brush; never scrub nor dabble. Every stroke shows when the paint dries. Try to make as few strokes as possible.
4. Keep each paint cake moist. Rub the brush across it in smooth, even strokes. Never scrub into the paint. It spoils the brush.
5. If you have to mix paint, mix enough in the box lid to do the whole painting job. You waste time if you don't.
6. Use very wet paint and lots of water, but be sure to have the water well colored with paint. We all like bright, "wet" looking drawings best. See illustrations above.
7. Always "try" the color before putting it on.
8. Let each color dry before you put another wet one near it unless you want the colors to "run." Sometimes in making washes you want the colors to blend together, then you mean to put wet colors side by side.
9. Clean up your paint box and point your brushes after using them.



Map of Columbus' Voyages. Grade 6—History

See color reproduction on page 63.

JOB SHEET 7—HOW TO PAINT POSTERS WITH OPAQUE WATER COLORS

Directions by EDWARD M., Grade 6, Lagrange School; MISS STENSON, Teacher

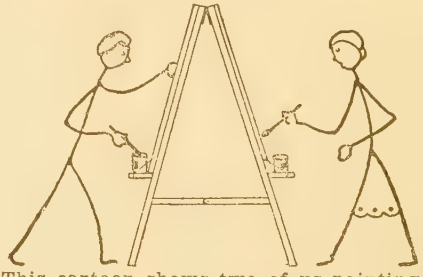
You will find several examples of our painted group posters on the color pages throughout this book.

I like these poster paints better than any other paints because they are so bright and easy to use. If you will read this carefully you will know all that I have found out about using them.

They come in all the colors of the rainbow and of our color wheel. They will mix together and make other colors. We use them on all kinds of paper, even on dark colors, because they are opaque. That means that you can not see through them. They go on smoothly. They dry quickly. When a color is dry you can put another color on top of it. This is good to know if you make a mistake. But you must not make too many mistakes and pile the colors too high for if you do they will crack off.

We paint on an easel to make these big painted posters. Several of us work on the same poster at different times when our other work is done. Sometimes I have found that it works best to make a cut paper layout of my own original plan for the poster. Then I draw around these original patterns and paint in the color in broad, even strokes. I use as few strokes as possible. I try to make the paint look as flat as paper. I like to use a different brush for each color because it saves time. But sometimes I only have one brush, then I have to wash it clean before I change colors. We use muffin tins or the tops of our water color boxes for mixing colors.

Often, we use poster paint like ink in our lettering pens. We letter all kinds of signs for the bulletin board. We use poster paints to color our wooden and cardboard toys and doll furniture and then we shellac them to keep the color on. We color our rag toys and dolls with poster paint. We paint fancy boxes with poster paint. We use these paints also at Christmas time for stenciling and block printing on cloth.



This cartoon shows two of us painting at our double easel. We use poster paints and large wash brushes.

JOB SHEET 8—HOW TO MAKE MARBLED PAPER

Directions by Grade 8, Pickett School. Committee: E. Wood, S. Kardos, M. Zawodi, C. Czerniak Mrs. McConnell's Art Club.

See sample of marbled paper used as a lining in the portfolio reproduced in color on page of color illustrations at the beginning of this chapter.

Preliminary: Read this through carefully to be sure that you know each step and can picture the whole operation clearly before proceeding.

Materials: A dripping pan, at least an inch longer and wider than the paper to be used. This may be purchased in any dime store or you can use an old pan if you find one large enough.

Oil paint, as many colors as desired. Most satisfactory results will be obtained by mixing primary colors. See Experiment IV—Problems 1, 2, 3 for data on color mixing.

A paint brush for each color of paint. Sticks to stir paint. Turpentine. Cream manila paper 9″x12″ or any colored paper depending on the effect desired. Newspaper to protect the desk.

Cautions: 1. Be sure to have a brush for each color of paint. The use of the same brush is apt to result in startling conglomerations of color.

2. Do not pour the paint onto the water; sprinkle it on with the brush.

3. Do not be careless about the consistency of the paint. If it is too thick it will settle to the bottom of the pan. If it is too thin it will not float, but will tend to mix with the water.

4. Be sure to make two sheets as nearly alike as possible, especially if you expect to use the paper as lining paper for portfolio. At first, in our eagerness to produce different effects, we made this mistake and found ourselves having to use lining papers that did not match.

Process: Assemble all materials conveniently. Cover the desk with newspaper. Pour enough water into the pan so that it will lack one inch of reaching the top. Open the cans of paint and stir well. If the paint seems thick, thin with turpentine to the consistency of cream. Place a brush in each can. At the left of the pan lay the stack of paper to be treated.

The next step is to float the paint on the water. This is done in the following manner: Take the brush from any one of the colors with plenty of paint adhering. Touch it to the water here and there over the surface. If a second or third color is desired on the same paper, repeat as with the first paper.

Now grasp a sheet of paper in both hands, drop it on the water, rough side down, and lightly press it under the surface of the water. A better known method is to slip the paper under the surface at one end of the pan, push it along carefully, still under water, and finally lift it straight up and out of the water. The first method described gives far better results, we think. Then lift the sheet of paper out carefully with the thumb and finger and place it on the newspaper to dry. The result will be "marbled" in effect.

Note—The usual rule should be to use only related colors which will often mix slightly to produce some wonderfully pleasing effects. However, an occasional drop of contrasting color will add interest. If you are making lining papers to use in portfolios try to repeat the colors of

the back strips, or cover pages. See Experiments III-IV for information on related and contrasted colors.

Uses: 1. Lining papers for portfolios.

2. Book binding problems of all kinds—memorandum pads, book covers, telephone screens, grocery lists, telephone pads, address books, etc.

3. Handkerchief holders and all sorts of envelope cases for gifts.

4. Box coverings. This paper is very attractive for covering gift boxes. We even used it for covering large hat boxes.

5. Electric light and candle shades made of "oil and water" paper shellaced or oiled.

6. Wrapping paper for packages.

JOB SHEET 9—HOW TO TIE AND DYE HANDKERCHIEFS

Explained by L. DORMAN and P. DUFFIELD, Grade 6, Navarre School

Materials: Four small pans, 3 colors of dye—1 red, 1 yellow and 1 blue. We used soap dyes because they are fast and do not stain the utensils. A white handkerchief or a piece of light cotton or silk cloth and an old cloth to wipe your hands on and plenty of white cord for tying.

Cautions: Have your desk and the table on which the dye is placed covered with old newspapers. Wind and tie the cord tightly so that the cloth under it does not take the dye.

Review Experiment IV—Problem 1—Color Mixing.—Hues to recall how primary colors are mixed together to produce other colors.

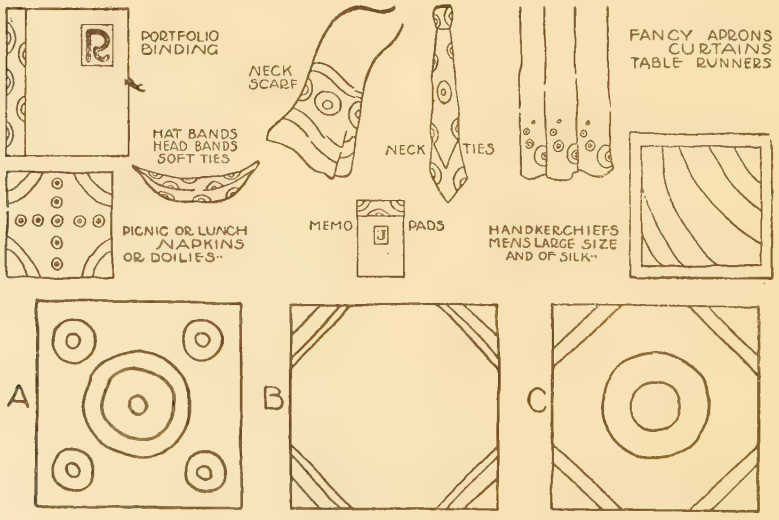
Directions: Plan your design by drawing it on paper.

Design A can be made by picking up the center of the handkerchief with the fingers and tying the cord around it tightly. This makes the center circle. Do the same in each corner.

Design B can be made by folding the handkerchief twice and then tying the cord across the center of the small square.

Design C can be made by tying the center circle and afterwards the lines at the corners.

Put one color of dye in each of 3 pans. If there is no gas stove at school, the dye can be dissolved at



home according to directions on the package and brought to school in a glass fruit jar. In the fourth pan put clean water.

Tie the string so as to make the pattern that you have drawn in your plan. Tie the strings tightly. Wind evenly in rows so that the string will come off easily.

Decide what two colors you will use.

Dip tied handkerchiefs in the clean water, then in one of the dye baths.

Tie new string on to cover up some of this first color.

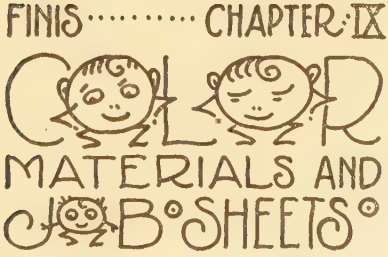
Remove the old string. The part under the old string should be white.

Dip in the second color.

Take off all string. The part which was white after the first dyeing takes the second color. The part which was tied second keeps the color of the first dyeing. The background part which was dyed twice is the color of the two dyes combined.

Note: This same method can be used on anything that you are dyeing. Tie-dyed muslin makes very fine bindings for your portfolios. Here are some things which we tied and dyed for gifts.

One Third Grade tied and dyed a fine dress and bonnet for a rag doll which they sent to a children's hospital. A Sixth Grade tied and dyed the blocks for a child's quilt.



This is the program of the Color Dramatizations which were presented at the Museum of Art at the end of the school year.

COLOR PROGRAM

by

Elementary Grades

Art Museum Hemicycle

4 P. M. Wednesday, May 12th

I—WHAT WE ARE TEACHING ABOUT COLOR.

Color Class—"Like and Unlike Colors"

Conducted by a child from Grade II, Lagrange School, Miss Stenson's Class.

II—HOW WE ARE TEACHING COLOR.

Color Wheels—A Pantomime

Grade VI, Gunckel School, Miss Smith, Teacher.

Color Combinations—A Playlet

Grade V, Whittier School, Mrs. Babcock, Teacher.

Color Mixing—A Dance

Grade II, Lagrange School, Mrs. Lammers and Mrs. Kelleker, Teachers.

III—HOW WE ARE USING COLOR.

Look through our Exhibit in the upper Galleries of the Museum and see for yourself. There will be a conducted tour of the Exhibit immediately following this program. The Art Supervisors will discuss the Exhibit with teachers of Grades I, II, on Wednesday, May 19th; of Grades III, IV, on Thursday, May 20th; of Grades V, VI, on Wednesday, May 26th; of Grades VII, VII, on Thursday, May 27th. Will you arrange to bring your class on some later date before the closing of school?

Note:—These COLOR PLAYLETS were selected from many which were developed in various schools throughout the city. They offer simple ways of reviewing color facts and at the same time afford effective material for AUDITORIUM PERIODS. As suggestive material, they are offered to you.

Chapter Ten

COLOR DRAMATIZATIONS AND PROGRAMS AS REVIEW OF WHAT THE COLOR STUDY HAS COVERED

These color playlets and programs are great fun to develop. They should spring from the color facts which are studied in the color experiments. The facts in them should always be accurate for they serve as review, drill, and summaries to the color study.

Color Plays and Programs are interesting to the whole school. They are interesting to other schools. They are interesting to outsiders. They show what the schools are doing in a graphic, fascinating way. Use one for your next school entertainment.

Color is always thrilling. Everyone likes to look at it. A Rainbow Row will hold all eyes. It makes the most vivid sort of stage work. It does not need much dressing up nor more imagination than the children have to take the color facts given in the color experiments and to work them into a dramatization, a pantomime, a parade, a pageant, a dance, or a short playlet.

The costumes are easy to make. They can be elaborate enough to cover each actor from head to toe with color, or they can be as simple as a crepe paper hat and sash. Either way they are effective and put over the color idea. The children can easily make their own costumes of crepe paper with details painted in with opaque poster paint or of cheap muslin dyed to match the rainbow hues. The children will like to do it and the very doing of it becomes a fine bit of color teaching and practice in color use. The stage needs no scenery, although a neutral background or curtain will help the colors to show up more.

Read the "Color For Your Pantomime" which follows. Carry it out as directed or better still vary it to fit your own situation by adding to or subtracting from it. Look over the Color Program on the preceding page. It may suggest ideas for one of your own.

Here are some other "Color Acts" that we have found effective. Try some of them out.

1. *A Color Lesson Given by a Second Grade* is always amusing. We have used this idea over and over again. The Color Lesson at our Museum Color Program was particularly amusing because the small Dora who was the teacher of the lesson appeared at the last moment all dressed up in her grown-up sister's clothes and carrying an immense handbag from which she extracted a vanity case and powdered her nose after the lesson was over and the children dismissed for the day. Furthermore she talked and acted so much like her own teacher that everyone recognized the unconscious mimicry.

2. *The Color Families on a Picnic.* This made a laughable act as the Mother of the Red family was very large and fat and the Blue family had a regular Peck's Bad Boy in its midst and a Baby who cried whenever the conversation lagged.

3. *The Color Wheel in a May Pole Dance.* The tall pole with its bright colored long ribbons and the rainbow colored dresses of the children made a lovely picture as they did the graceful May Pole dance and wove the ribbons around the pole to the tune

of a Color Song for which the children had written color words.

4. *A Color Mixing Dance.* The children entered in pairs, their heads hidden under a large umbrella which they carried. Each pair was dressed to represent the primary colors which mixed together made the color of the gay umbrella. One pair wore yellow and blue and carried a green umbrella. Another wore red and yellow and carried an orange umbrella, etc. They did a Dutch Dance.

"COLOR FOR YOU"

A DRAMATIZATION OF COLOR FACTS

This dramatization was developed by the children of a Fifth Grade. It was first given as an auditorium stunt in their own school and later as a part of a Color Program to which many schools contributed.

Characters:

A Small Boy
A Small Girl
Gray, the Manager of the Colors.
10 or 12 Hues, representing the Spectrum Colors.

Also an Announcer, who is one of the children holding a card on which is lettered (In black against white, cut paper letters) the announcement of what is happening. There are 8 of these signs. They are: 1. The Rainbow. 2. Warm and Cool Colors. 3. Color Mixing—Hues. 4. Related Colors which Blend. 5. Opposite Colors which contrast. 6. Color Combinations—the Effect of Colors on Each Other. 7. Color Amounts—Only a Little Contrast. 8. The Color Wheel.

Curtain opens to show the Small Boy and the Small Girl looking at a Big Book.

The Small Boy says: "I wish it had colored pictures. I like them better."

The Small Girl replies: "I wish that colors had legs and could run around. What fun it would be to see them get all mixed up."

The Small Boy: "Let's close our eyes and maybe we can see them. Sometimes when I close my eyes and think hard I can see all sorts of things."

The Small Girl: "Are your eyes closed now? Mine are and I can see funny colored lights and stars and oh, yes! I can see colors with legs and they're dancing along in a line like we do when we play train?"

Sound of pattering feet off-stage and in comes a whole line of Rainbow Hues, arms extended sideways, body swaying right, then left. They snake dance around the stage then off again while the Small Girl talks.

Costumes: Each color is dressed in a crepe paper or dyed muslin straight dress with a deeply slashed hem line and long slashes at the end of full sleeves.

Headdress of cardboard bent to form a very tall cylinder, slashed at

the top, covered with crepe paper or painted with poster paint. Add a Jack-o-lantern Funny Face with eyes cut out and nose and mouth painted on. A slashed ruffle around the neck, if you wish it. Stockings of white, pulled over outside of slippers, or stockings dyed the color of the costume.

The children open their eyes and look at each other.

The Small Girl: "Did you see something?"

The Small Boy: "Yes . . . Let's try it again, maybe they will come back."

Both close eyes. Silence reigns again, until the Colors, one by one, come stealing stealthily in. Gray comes first, then Yellow, and so on down the Rainbow line.

The Small Girl: "I don't see them and I don't hear them."

The Small Boy: "I guess they ran away somewhere else to play."

Both open eyes and exclaim in surprise at the colors which are standing like strange modernist statues all around the room. Gray, in a dull monotonous voice begins by saying:

"I am Gray. I have all other colors in me. I am neutral. I go with all colors. I can manage these colors. May I have them show you their tricks? Speak, colors, and tell the children your names."

Yellow speaks in a high, shrill, voice:

"I am Yellow. I am sunlight. I am joy. I am good for you. If you can each name a fruit of my color before I count ten, I will stay with you."

Yellow starts counting; the children answer. The next color speaks, etc. etc., until it is time for purple who says in a deep base voice:

"I am Purple. I am a royal color. I cover the distant mountains. I paint the shadows of the evening. If you can each name a flower of my color, I will stay too."

Purple starts counting. Children answer. Gray claps his hands and tells the Colors to form a Rainbow for the children. The Announcer holds up the card which reads, "This is the Rainbow". The Colors quietly and quickly form a line. Each one gives his name in his own sort of voice. Yellow is a high voice. Purple is a deep voice. The other Color-Voices range in between, making a scale from high to low. The Color names are first given down the line and then back up it. Repeated once or twice, this gives an odd effect. The children try to say the color names.

Gray again claps his hands. The colors separate and form two circles, one of warm and one of cool colors. They dance round and round. The warm colors go faster and faster and grow more and more excited. The cool colors go more and more slowly and grow more and more calm. Each circle tries to catch the small boy or girl in it. The warm colors chant in unison:

"We-are-the - hot - hot-colors. We-are-the - hot - hot - fire. We make - you - feel - warm-and-excited."

The cool colors chant in unison:

"We-are-the-cold-cold-colors. We - are - in - cold-cold-ice. We are in deep, cold, water. We make-you-cool-and-quiet."

The children escape from the circles, one is shivering with cold, one is breathless and excited. They drop on the floor near the front foot lights.

Gray claps his hand. The Announcer holds up the card which reads: "Color Mixing—Hues". Red

and Yellow come slowly forward side by side with some sort of awkward step. When they are facing both the children and the audience, Orange pushes out from between them saying,

> "I am part Yellow. I am part Red. Yet I am neither Red nor Yellow; what am I?"

The children answer. If they make a mistake Gray corrects it, scolding as he does so. Blue and Yellow, and Red and Blue next do likewise making green and purple. Yellow-Green is shown by having the Yellow and Green come forward, or by having the yellow and blue come forward with the blue walking so that one-half of his color is hidden behind Yellow. All of the other intermediate colors may be worked out in a similar way, if desired.

Gray again claps his hands and says:

> "Some of us are alike. Some of us are unlike. Some of us blend together. We are in the same family. Some of us contrast, we are strangers. Colors, we will play soldiers, and show the children how well we work together. The Yellow Company, ready! Mark time! At ease! Now for the roll call. Lieutenant Yellow, report! . . . Attention! March!"

While Gray is speaking, the Color families form into three lines, ready for marching to the tune of "The Wooden Soldiers" from the Chauve Souris. Each row marches in turn as ordered. The Colors which belong in two lines change back and forth so that each, as it drills, is correct. Gray claps his hands and says:

> "Now, we will show you which of us are unlike. We can not march well together. We can not work well together. We can not understand each other. We are very different. Our steps do not fit. Opposite Colors, begin to dance!"

The Opposite Colors take a position as for dancing, only they stand back to back instead of face to face. They try to dance. They have a great deal of difficulty. Any tune which is noisy and not too rhythmical, will do for this dance.

Gray claps his hands. The Hues jump apart and once more form a Rainbow Row standing at attention. Gray again claps his hands. The Hues form groups, the three Greens in one group, the three Purples in another, etc. This leaves Red, Yellow and Blue alone.

Gray claps again. The Announcer holds up the card which reads, "Color Combinations—The Effect of Colors on Each Other." The Yellow skips in and out among the Purples. The Reds skips in and out among the Greens, etc. Gray announces in his monotonous voice:

> "Look carefully, Children, see how bright the Red looks among the Greens. Can you tell why?"

The children answer. The red then skips up and dances in and out among the Purples. Gray remarks:

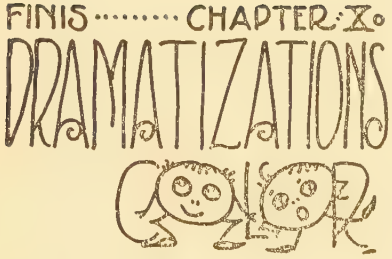
> "Watch, Children, and notice how the Red blends in."

The Red, Yellow, and Blue interchange and skip in and out, first among the unrelated and then among the related colors. Each finally stops among its unrelated colors, but much hidden and peering round so that only the hat and head shows. The Announcer now holds up the card which reads, "Color Amounts —Only a Little Contrast." Gray remarks:

> "A little bit of contrast adds snap to the quiet grays."

As he speaks the Red, behind the Green group, clowns a bit by appearing in all sorts of unexpected places, by kicking a foot out at the side or by peering over a shoulder.

Gray claps loudly. The Hues form a Color Wheel. Gray pushes into the center. The children applaud. The Wheel turns faster and faster and faster, until it is a whirling ring of color as the curtain falls.



CONCLUSION

In this book we have tried to point out to you an active, forceful way of acquiring color information. We have not tried to set forth any new color data, but only to give to you a method of color study which we have liked to use. We have explained for you the experiments which we used and the explanations and reviews which we have developed. We hope that you have found something useful in each of them. We hope that you have enjoyed what you have found. We hope that you have used what you have found over and over again.

J. B. W.

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